# HEAVY MEDIA SEPARATION OF POTASH ORE

## PHASE II

A Division of Cominco Ltd.

# HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

By: Cominco Fertilizer, Potash Operations
Vanscoy, Saskatchewan

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**HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II**

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## 1.0 EXECUTIVE SUMMARY

Phase I of the Heavy Media Separation (HMS) project was a preliminary investigation undertaken to establish the applicability of HMS technology, using a Tri-Flo sparator, for the processing of Saskatoon area potash ores.

Test work in this phase included laboratory studies to determine ore liberation characteristics and grade-recovery relationships, investigation of various potential feed materials, and batch testing of a small Tri-Flo separator at Lakefield Research in Lakefield, Ontario.

Positive results obtained in Phase I led to Phase II involving in-plant testing of a continuous Tri-Flo separator pilot plant at both Central Canada Potash (CCP) at Colonsay, Saskatchewan and Cominco Fertilizers, Potash Operations at Vanscoy, Saskatchewan

Positive results were again obtained in the second phase of this roject. Results indicate that HMS using a Tri-Flo separator is a technically viable processing step which could complement the processing steps currently employed in the processing of Saskatoon area potash ores. Implementation would result in both a reduction in processing costs and could allow an increase in milling rates depending upon the specific limiting factors in mill operation.

The cost to add an HMS plant onto an existing Saskatoon area potash concentrator is estimated to be between $6.5 and $7.0 million. Included in this cost are building, HMS equipment and installation. The operation of such a plant could reduce the overall annual cost to produce a product, by $2.9 million, and incur an operating cost of $1.58 per tonne of product.

Additional savings may be realized if the processing components of the HMS plant could be installed into the existing concentrator. The resulting capital cost would be about $4.0 million and the corresponding production cost may be reduced to $1.20 per tonne of product. Other potential benefits exist in the possibility of marketing a very coarse salt as a deicing agent on highways.

## 2.0 ACKNOWLEDGEMENTS

The key financial support of the Federal and Saskatchewan governments is acknowledged, as well as technical support from Mr. G. Feasby, CANMET.

Essential to the success of this phase of the project was the participation of the Sakatchewan Potash Producers Association members, namely Central Canada Potash, a Division of Noranda Metals and the Potash Corporation of Saskatchewan.

The assistance of Outokumpu Equipment Canada Ltd. and Impromin representatives during the pilot plant start-ups was also appreciated.

## 3.0 TECHNICAL SUMMARY

### 3.1 INTRODUCTION

The modulized 15 tonne/hr. Tri-Flo separator based pilot plant used in the second phase testwork was leased from Esso Resources through Outokumpu Equipment Canada Ltd.

The pilot plant was first tested at Central Canada Potash (CCP) in order to take advantage of the warmer weather due to the outdoor installation at CCP. Testwork at CCP commenced on Septamber 2 and ended on Septamber 29, 1987.

The pilot plant was then relocated to the indoor location at Cominco Ltd. where testwork was conducted from November 2 to December 10, 1987.

## 3.2 TESTWORK

### 3.2.1 OBJECTIVES

The second phase testwork had the following objectives;

a) Verify Phase I results on a larger scale.

b) To establish performance under continuous operating conditions including;

   i) Effect of ore variations.

   ii) Ability to control media density.

   iii) Ability to vary the mass distribution between Tri-Flo products while maintaining desired performance.

   iv) Effect of fines build up in the media.

   v) Media consumption rates.

c) To observe differences in separation performance between various types and size distributions of feed material.

d) To establish the best media constituents.

e) To determine the effect of feed rate on separation performance of the Tri-Flo separator.

f) Investigate the economics of full scale operations.

### 3.2.2 TEST PROGRAMS

The test programs at the two mine sites were similar in that grade/recovery relations were established and the efficiency of separation, as well as pertinent operating parameters were determined. Differences in the programs were as follows:

Testwork at CCP was done using a 6 x 28 mesh fraction of dry mill feed taken from the crushing plant and separated from the other size fractions using a Sweco screen.

Cominco testwork studied three types of wet feed material. Each was taken from different points in the plant circuits having varying degrees of insolubles removal prior to HMS. A 6 x 14 mesh fraction was obtained from these materials using a DSM and Derrick vibrating screen combination. The size of the pilot plant feed material was also increased during the Cominco testwork in order to establish the effect of particle size on separation performance.

### 3.2.2 TEST PROGRAMS - (continued)

It was originally hoped that magnetite alone would provide a suitable media for separation purposes. A fine grade (Grade B) of magnetite was used at the CCP site but poor performance necessitated the addition of ferrosilicon. Based on these results a coarser grade (Grade G) of magnetite was employed at Cominco but similar results were obtained and again a blend of magnetite and ferrosilicon has to be used for media.

### 3.2.3 DETAILS

Most of the work conducted in the second phase of the HMS project has been covered in two progress reports.

Progress Report I, Appendix A, details testwork and results obtained from the CCP installation.

Progress Report II, Appendix B, details testwork and results obtained during the Cominco testwork.

Appendix C Progress Report III contains the results from some follow up laboratory testwork performed on samples obtained form the Cominco test program.

Appendix D contains the economic analysis of the capital cost for a full scale HMS plant building.

Appendix E analyses the capital and operating cost of a full scale Heavy Media Separation plant as an addition to an existing potash concentrator.

### 3.2.4 RESULTS AND CONCLUSIONS

The following is a summary of the major results from the Phase II testwork. More minor conclusions and support for the conclusions below can be found in the appended progress reports and Appendix 3.

Progress Report I (Central Canada Potash)

The Tri-Flo separator was able to produce a fertilizer grade concentrate with an estimated 70% recovery on a 6 x 28 mesh fraction of mill feed. Eight percent of the Kcl and 85 percent of the WI was rejected to tails for final disposal.

Useful data on media consumption rates could not be obtained because of the underdesigned media recovery circuit in the pilot plant.

Separation efficiencies of the Tri-Flo compared favourably with traditional measures of the quality of the separation using various types of equipment.

Progress Report II (Cominco)

There was very little difference in grade/recovery performance between the three different types of feed material with varying insol content. This would indicate that the action in the Tri-Flo separator results in some desliming of the feed material as well as separating it into the three products. (As the primary insoluble feed material has undergone the least amount of processing, it would likely be the best material for treatment).

A difference in grade/recovery performance between tests with coarse feed and tests with normal size feed was found. Subsequent testwork indicates this results from poorer particle liberation at the coarse sizes rather than a separation inefficiency.

Variations in recovery at similar grades among tests with the same product were small. The slight scatter is believed to be due to density control problems associated with establishing stable operation with such low media volumes.

Tests using a blend of ferrosilicon and Grade G magnetite produced significantly better results than did Grade G magnetite alone. Similar results were found in the CCP testwork using the even finer Grade B magnetite. There is still the possibility of an even coarser grade magnetite working, provided the media classification action in the Tri-Flo is sufficient to produce the required media differential across the Tri-Flo separation compartments.

Progress Report III (Cominco)

The traditional measure of Heavy Media Separation efficiency, Ep, generally ranges from .02 to .06[1]. As indicated by the results in Figure 1 and Table 1 separations obtained in this testwork were very good, with EP's between .015 - .030.

## 3.2.4 RESULTS AND CONCLUSIONS - (continued)

Progress Report III (Cominco)

These results also indicate that there is little, if any, difference in separation performance between the three different materials tested. Any differences are likely due to ore variations or variations in the testwork rather than degree of pretreatment.

Size fraction analysis of the samples indicate that a lower percentage of the +6 mesh material reports to the concentrate when the coarser feed material was tested. Efficiency curves indicate similar separation performance for all size fractions hence indicating an ore liberation problem rather than a separation problem at these particular sizes.

The +6 mesh material, as a percentage of the total concentrate weight was much higher in the coarse feed testwork and this move then compensates for the lower recoveries obtained.

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# APPENDIX A

# HEAVY MEDIA SEPARATION OF POTASH ORE

## PHASE II

## PROGRESS REPORT I

## A. HIGHLIGHT REPORT

## HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

### 1.0 GENERAL

This is the first progress report for the Phase II project and covers the test work and analysis of results from the H.M.S. Phase II testing program carried out at the Central Canada Potash Division of Noranda Minerals Inc.

### 2.0 SCHEDULE

Test work at the Central Canada Potash Operation was conducted from September 2 to September 29, 1987. Originally, the testing period was expected to cover two months at each site. However, a major equipment failure in Central Canada's processing plant necessitated the premature termination of the testing program.

The pilot plant was relocated to Cominco Potash where the testing program commenced on November 2, 1987. The testing program included a period of continuous operation covering a total of 112 hours.

Difficulty with the operation of the pilot plant was observed at both sites. The problems at the CCP site reduced the amount of time available to operate the pilot plant to obtain results.

The progress of the project is on schedule despite the operational problems encountered.

#### 2.1 Overall

| | |
|---|---|
| ° Control Schedule Completion | March 31, 1988 |
| ° Estimated Completion | March 31, 1988 |

#### 2.2 Milestones

| | |
|---|---|
| ° Commencement of Testing Program | September 2, 1987 |
| ° Conclusion of the CCP Testing Program | September 29, 1987 |
| ° Commencement of the Cominco Testing Program | November 2, 1987 |
| ° Conclusion of the Cominco Testing Program | December 10, 1987 |

. . . 2

## 3.0 COST SUMMARY

This report covers only the analysis and results from the Central Canada Potash testing program. The costs, however, are for the period from August 10 to December 31, 1987. This cost summary includes the costs to get the pilot plant operational at both sites, to do the testing programs at the sites, to do the laboratory testing of the CCP samples and to prepare the CCP progress report.

Further charges will occur during the first quarter of 1988. These will be for the laboratory testing of the Cominco sample and the preparation of the reports covering the Cominco work and the final project report.

Expenditures to carry out the work completed in 1987 have exceeded the revised total budget proposed.

| | | |
|---|---|---|
| 3.1 | Approved Revised Control Cost | $ 203,000 |
| 3.2 | Project Expenditures (To December 31, 1987) | $ 223,683 |
| 3.3 | Estimated Final Project Cost | $ 256,100 |
| | Variance | ($ 53,100) |

A detailed analysis of the overrun is attached to this Highlight Report.

The original budget was revised to reflect a diminished scope whereby the pilot plant was only operated at two sites instead of three. The testing at CCP was done using a dry unscrubbed feed. This feed presented some difficulties during the testing and may not be of representative of what would be treated in an actual operation. The Cominco test program was therefore broadened to include wet feeds with various concentrations of insolubles. A significantly larger particle size was also tested. This increased the manpower requirement for the Cominco program.

Significantly greater than anticipated maintenance manpower was required for the installation of the feed preparations screens at the two sites, setting up the pilot plant at the two locations and maintaining the pilot plant during the testing program. It was necessary to use a mixture of magnetite and Ferrosilicon as media which is more costly, rather than magnetite only. Freight costs on moving the pilot plant were greater than budgeted. There was no allowance in the budget for the rental of the feed preparation screen at the CCP site or 440 volt transformers.

A contract plan and report form has also been prepared and is attached to this highlight report.

## 4.0 OVERALL PROGRESS REVIEW

The project has progressed as per the schedule. No problems are anticipated in meeting the completion deadline of March 31, 1988.

CLittmann/red
Vanscoy Office
January 14, 1988

Attachments:

## HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

### COST ANALYSIS

| Item | Budget Hours | Budget $ | CCP 1987 Hours | CCP 1987 $ | Cominco 1987 Hours | Cominco 1987 $ | 1988 Hours | 1988 $ | Total Hours | Total $ |
|---|---|---|---|---|---|---|---|---|---|---|
| **1) Labour Cost** | | | | | | | | | | |
| - Sample Analysis | 260 | 6,786 | 100 | 2,610 | 249 | 6,499 | 40 | 1,044 | 389 | 10,153 |
| - Operate Tri-Flo and | [1,460 | 48,326 | [470 | 15,557 | [1,051 | 34,805 | [ | | [1,839 | 59,502 |
| Process Lab Work | [ | | [198 | 5,168 | [ | | [120 | 3,972 | [ | |
| - Maintenance | 1,100 | 24,750 | 782 | 17,595 | 912 | 18,677 | | | 1,694 | 36,272 |
| **2) Meetings** | | | | | | | | | | |
| - Preliminary Project Development | 100 | 3,830 | 54 | 2,068 | 75.5 | 2,891 | | | 129.5 | 4,959 |
| - Site Reports | 200 | 7,660 | 80 | 3,064 | | | 100 | 3,830 | 180 | 6,894 |
| - Clerical | 80 | 1,600 | 30 | 600 | | | | | 30 | 600 |
| **3) Project Management** | | | | | | | | | | |
| - Management and Final Report | 160 | 6,128 | | | | | 200 | 7,452 | 200 | 7,452 |
| - Clerical | 60 | 1,200 | | | | | 60 | 1,200 | 60 | 1,200 |
| **4) Other Costs** | | | | | | | | | | |
| - Consulting | | 10,000 | | | | | | 8,217 | | 8,217 |
| - Lease | | 58,000 | | | | 54,570 | | | | 54,570 |
| - Materials | | 11,000 | | 5,523 | | 14,128 | | | | 19,651 |
| - Media | | 10,000 | | 6,918 | | 8,627 | | | | 15,545 |
| - Other Rentals (Transformers, Sweco Screen) | | | | 12,134 | | | | | | 12,134 |
| - Freight/Crane | | 13,720 | | 10,441 | | 1,808 | | 6,720 | | 18,969 |
| **Total** | | 203,000 | | 81,678 | | 142,005 | | 32,435 | | 256,118 |

DAConnode/red
Vanscoy Office
January 8, 1988

| Item | Budget | Actual/Est | Variance | Remarks |
|---|---|---|---|---|
| **1) Labour Cost** | | | | |
| Sample Analysis | 6,786 | 10,153 | ( 3,367) | During continuous operation test at Cominco, a dedicated analyst was required in addition to 2 operators on pilot plant. 96 hours in total $2,506. Increased number of test runs at Cominco; hence, more analyses. |
| Operating Tri-Flo | 48,326 | 59,502 | (11,176) | Noranda labour was 92 hours below budget. Operated plant longer at Cominco to get 3 types of wet feed tested - deslimed, partially deslimed and no desliming and also coarser feed and using magnetite without Ferrosilicon. Cominco labor 451 hours above budget. It was considered desirable once plant was running well and results valid. |
| Maintenance | 24,750 | 36,272 | (11,522) | Noranda additional hours in erecting and getting plant operational. Cominco pipefitting work above budget to test different feeds. Demag coil changed twice. Considerable time to install railings and walkways to meet safety requirements on pilot plant and install feed preparation screen. |
| **2) Meetings** | | | | |
| Prelim. Proj. Dev. | 3,830 | 4,959 | ( 1,129) | Changed scope from 3 mines to 2 and responded to other complications. |
| Site Reports | 7,660 | 6,894 | 766 | |
| Clerical | 1,600 | 600 | 1,000 | |
| **3) Project Management** | | | | |
| Management Final Report | 6,128 | 7,452 | ( 1,324) | More data, evaluation of savings under different feed conditions. |
| Clerical | 1,200 | 1,200 | - | Not expended yet - no reason to believe cost will change. |
| **4) Other Costs** | | | | |
| Consulting | 1,000 | 8,217 | 1,783 | Report required less time than estimated. |
| Lease | 58,000 | 54,570 | 3,430 | Supplier set rental on basis of 5 months use at 3 mines. When dropped to 2 mines, monthly rate increased, but used only 4 months. |
| Materials | 11,000 | 19,651 | ( 8,651) | Noranda as per budget. Major Cominco expenditures for piping, panels for feed preparation screen, repairs to electric motors and steel for feed preparation screen support. |

| Item | Budget | Actual/Est | Variance | Remarks |
|---|---|---|---|---|
| **4) Other Costs** - Continued | | | | |
| Media | 10,000 | 15,545 | ( 5,545) | Ferrosilicon (not budgeted) required in addition to magnetite. Signigicant quantity of media left over can possibly be sold. 12 drums of Ferrosilicon purchase price $2,885 and 32 bags Magnetite purchase price $734. |
| Other Rentals | - | 12,134 | (12,134) | Transformer rental and Sweco screen rental by Noranda not included in project budget originally. |
| Freight | 13,720 | 18,969 | ( 5,249) | Budgeted transportation to and from Vancouver at a total cost of $7,400. Paying for Geco-CCP and Cominco-Esso, at a total cost of $16,440. |

D. A. Commode, Superintendent
Engineering and Technical Development

DAC/red
Vanscoy Office
January 8, 1988

## B. PROJECT PROGRESS REPORT

# HEAVY MEDIA SEPARATION PILOT PLANT TRIAL

# AT

# CENTRAL CANADA POTASH DIVISION, NORANDA MINERALS INC.

# TRI-FLO SEPARATOR PILOT PLANT TRIAL

CENTRAL CANADA POTASH DIVISION

NORANDA MINERALS INC.

A. G. PEREIRA

SENIOR PROCESS ENGINEER

NOVEMBER, 1987

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# INTRODUCTION

In October, 1986 CCP ore was tested on a batch scale Tri-flo separator located at Lakefield Research, Lakefield, Ontario. These tests were conducted on 6 x 30 mesh mill feed and indicated that the Tri-flo separator could produce a fertilizer grade concentrate and a discardable tail from a single stage operation. (See Reference 1)

CCP participated in a joint research project with other potash producers to verify these results on a continuous pilot plant which could be transported to various mine sites. The project was funded by the federal and provincial governments and participating potash producers. The pilot plant was rented through Outukumpu Equipment Canada Limited, who also supplied technical support in collaboration with Impromin Ltd.

The plant was ready for start-up on September 2, 1987. The trial continued until September 29th when work was terminated due to a mill shutdown necessitated by failure of the main thickener rake drive mechanism.

## OBJECTIVES OF TRIAL

The following work was planned:

1. To determine operating conditions for achieving optimum KCl recovery at an acceptable grade for a 6 x 28 mesh fraction of mill feed.

2. To operate the plant continuously to determine the following:

   (a) Effect of fines build up in the media.

   (b) Media consumption rates.

   (c) Difficulty in maintaining plant at steady rate.

## SUMMARY

1. The Tri-Flo separator was able to produce a fertilizer grade concentrate with 79% recovery on a 6 x 28 mesh fraction of mill feed. Eight percent of the KCl and 85% of the WI was rejected to tails for final disposal.

2. The Tri-Flo tails losses can be reduced to about 3% KCl by using two stages of separators. This alternative will have to be studied further.

3. A practical Tri-Flo plant will have to address several problems which were encountered in the plant trial, as follows:

   (a) Excessive froth generation.

   (b) Accurate density control.

   (c) An adequately designed media cleaning system for removal of potash fines.

   (d) Elimination of fines from the feed.

   (e) Reprocessing of fines rejected from media cleaning system.

4. The trial did not supply useful data on media consumption rates as the media recovery system on the pilot plant was poor.

5. Detailed heavy liquid testing on retained samples indicates considerable amounts of misplaced material in the three Tri-flo products, although traditional measures of the quality of the separation give a performance rating of "very good" for these results.

## CONCLUSIONS

The Tri-Flo separator shows great promise as a new technology in the production of fertilizer grade potash and should be considered favourably in any plans for cost reduction or increase in milling rates at CCP.

It is recommended that future work on the Tri-Flo separator be done on a scrubbed, deslimed feed,rather than on dry ore, as it would eliminate many of the problems that occurred during the plant trial. The Tri-Flo pilot plant trial in progress at Cominco Potash is using a scrubbed feed and this data will be used for further evaluation of the process.

## DISCUSSION

1. Tri-Flo separator operating results are presented in Tables 1 to 9 and Figures 1 to 5 in Appendix I.

   All test work was done on a 6 x 28 mesh feed fraction which accounts for 60 - 65% weight of mill feed. Feed rates were in the 3 to 7 tph range for all test runs.

   The following conclusions are drawn from Figures 1 to 5 in Appendix I.

   (a) The Tri-Flo separator produces a 95% KCl grade concentrate with 79% recovery when 30% weight is distributed to the float.

   (b) By inspection of all the results, it can be seen that a high grade concentrate is produced only when a minimum of 50% weight reports to the tails. At 50% weight distribution, the tails contain 8% of available KCl and 85% of the WI.

   (c) The middling from the Tri-Flo separator contains about 20% of the weight distribution and has a 20 - 30% KCl grade and 1.5 - 2.0% WI. The middling can be recovered in the existing grinding and flotation circuits in the mill. The Tri-Flo tails cannot be retreated in the existing grinding and flotation circuit due to the large amount of WI contained in this material.

   (d) The Tri-Flo tails loss can be substantially reduced by having two stages of separators. The first stage would reject about 25% weight containing 3% of available KCl and 67% of WI. The first stage middling and concentrate would be combined and fed to a second stage Tri-Flo separator. The second stage would produce a final grade concentrate, the middling and tails would be combined for reprocessing through existing grinding and flotation circuits. The operating performance of a two stage system is expected to be superior to a single stage, but this option will have to be evaluated further.

   (e) It should be noted that recoveries quoted in the preceding sections are based on a calculated head from a combination of the three products and do not take into account the loss of fines.

   Fine potash that passes through the Deister screen is lost with magnetic separator effluent. It is expected that substantially all the -48 mesh potash that reports to the Deister screen will be discarded in this manner. The fines originate in the feed or are generated internally through attrition. It was not possible to determine this loss directly as the fines were readily dissolved in the under-saturated brine which was used for this test.

   Laboratory tests were done on retained samples of feed to estimate these losses. (See Appendix III-Tables 4 and 5) On average the Tri-Flo feed contained 2% weight of -48 mesh which increased to 7% after mixing with brine. The KCl distribution to -48 mesh was 5%,

and half of this was in the -200 mesh material.
It is expected that the -48/+200 mesh material can be recovered through the existing deslime circuit but -200 mesh will report to tails.

(f) Problems in operation and recovery can be eliminated by feeding the Tri-Flo separator a scrubbed, deslimed feed. This would allow the reprocessing of Tri-Flo tails in the grinding circuit and increase overall recovery of potash. Another advantage is that the existing deslime area can be modified to perform this function and it would obviate the need for two stages of Tri-flo separators as discussed in (d) above. Tri-Flo separator performance on scrubbed feed is expected to be equal to or better than on dry feed.

(g) The low media specific gravity determines concentrate KCl grade, but results of different sampling days are not consistent. A plot of concentrate grade and low media specific gravity gives a series of roughly parallel lines indicating various levels of media viscosity due to media contamination with fines. The most consistent results are from September 19 and 29 when low solids feed rates to the Tri-Flo helped keep the media clean. These two sets of data indicate a low media specific gravity of 2.01 was needed to maintain 95% KCl grade. The high media specific gravity determines tails KCl and WI grades. A minimum tails grade of 4.0% KCl was achieved with a high media specific gravity of 2.15.

2. Operating problems encountered during the plant trial are detailed in Appendices II and III and are summarized below.

(a) Cooling of plant brine in the outdoor location of the pilot plant resulted in the Deister screen blinding off rapidly with crystallized material. Screen blinding is not expected to be a problem in a heated indoor plant.

The blinding problem in the pilot plant was resolved by using the unsaturated reclaim brine supply, but this resulted in a dissolution of 0.8 tph of product.

(b) Excessive froth generation was partly resolved by using MIBC as a defrothing agent. Froth generation could be reduced by adequate design, but is expected to be a problem in any plant.

(c) Density indication and control via the gamma gauge system proved to be unreliable, probably due to entrained froth. As density control has to be accurate within about 0.01 sgu for adequate control of the plant, a great deal of effort will be required for design of a reliable control system. It is expected that on-stream analysis of all product streams will be incorporated into a full scale plant to improve control.

(d) Magnetite grade B in brine did not provide a media of suitable viscosity until Ferrosilicon was blended into the system. It is probable that a different grade of Magnetite would have performed adequately on its own, but this will have to be determined by further testing.

(e) The media cleaning system could not perform adequately at feed rates higher than 3 - 4 tph. At higher feed rates, a build up of fines in the media caused the Tri-Flo separator performance to change rapidly over time, due to changes in media viscosity. As there is a considerable amount of fines coming in with the feed and being internally generated through attrition, it is expected that a full scale plant would incorporate an oversized cleaning unit.

3. The Sweco screen performance data is given in Appendix IV. Obtaining a feed that was free of excessive fines was a difficult problem to resolve. For most trials, the feed contained 7 - 9% of -28 mesh material. This level of fines contamination is expected even in a full sized plant and retreatment of the fines for recovery of KCl values will have to be considered in plant design.

4. This trial does not supply good information on media usage rates as product washing on the Deister screen is poor and substantial amounts of media is lost from the single stage of magnetic separation.

For this particular trial, about 100 pounds per hour of magnetite and 30 pounds per hour of Ferrosilicon were used when the feed rate to the plant was six tons per hour. (A consumption rate of about 22 pounds/ton!)

5. Laboratory fractional analysis results of selected Tri-Flo runs are presented in Appendix V (Tables 1 to 5 and Figures 1 and 2). The following is evident from these results:

(a) The -28 mesh concentrate which could be up to 5% of the weight is always off grade. The 14 mesh fraction always has the highest grade. Concentrate WI grade is consistently about 0.5% WI for all fractions.

(b) The concentrate and middling size distributions are very similar but the tails contains a significantly higher amount of 8 and 10 mesh material.

6. Results of heavy liquid separations on selected Tri-Flo runs are presented in Appendix VI (Tables 1 to 6 and Figures 1 to 4). The following points are evident from this data:

(a) Efficiency of the separation as represented by the slope of the Tromp curve indicates a value of 0.04 for the first section and 0.02 for the second section of the Tri-Flo separator. The literature on this subject indicates that a separation with a slope of 0.02 to 0.05 on the Tromp curve is judged to be very good. The effective separation density indicated on the Tromp curve was about the same as the media density.

Although the Tromp curve slope indicates a very good separation, inspection of the heavy liquid data indicates a substantial amount of near gravity material being misplaced in all three of the Tri-Flo products as follows:

Concentrate contains: 14% by weight of 78.4% KCl grade material.
Middling contains: 17% by weight of 98.8% KCl grade material
and 40% by weight of 2.0% KCl grade material.
Tailing contains: 21% by weight of 18.6% KCl grade material.

(b) A 95% KCl grade float could be produced in 36% of the weight with 89% recovery.

(c) A liquid of specific gravity 2.07 will float all material with a cumulative grade of 95% KCl.

(d) A liquid of specific gravity 2.16 will give a sink of 4% KCl. This is the minimum grade sink achievable. The sink grade on progressively higher specific gravity liquids increases due to the presence of KCl inside the higher gravity clay particles.

## REFERENCES

1. An investigation of heavy media separation of potash ore from CCP. Project No. LR 3240 by Lakefield Research.

# APPENDIX I

## OPERATING RESULTS AND SAMPLING PROCEDURE

| | |
|---|---|
| Tables 1 - 4 | Results from September 12, 14, 15 and 16, 1987<br>These results are not very useful for performance evaluation as product streams were not weighed in the belief that material balance calculations based on KCl and WI assays would yield this data, however, material balance data based on assays proved to be unreliable. |
| Tables 5 - 6 | Results from September 19 and 21, 1987<br>The Tri-Flo separator feed was shut off intermittently to determine various media densities. |
| Tables 7 - 8 | Results from September 22 and 24, 1987<br>The Tri-Flo separator had steady, continuous feed for several hours, however, due to fines build up in the media it was not possible to keep the Tri-Flo separator operating under steady conditions. |
| Table 9 | Results from September 29, 1987<br>Consistent results with Tri-Flow separator fed continuously for several hours. Feed rate was kept low for media cleaning circuit to keep adequate control on contaminants build-up. |

| | |
|---|---|
| Figure 1 | Distribution of Concentrate and Tails as a Function of Recovery |
| Figure 2 | Distribution to Concentrate as a Function of KCl Grade |
| Figure 3 | Distribution to Tails as a Function of WI Grade |
| Figure 4 | Concentrate and Tails KCl Grade as a Function of Media Specific Gravity |
| Figure 5 | Tails WI Grade as a Function of High Media Specific Gravity |

## SAMPLING AND SAMPLE PROCESSING

The feed and product streams were sampled as required. The feed rate was measured periodically.

The product streams were wet screened at 100 mesh to reject media (which interferes with the WI assay*) and the oversize was filtered, washed in methanol and dried for assay of KCl and WI. The moisture content of the original sample and the weight percent of the rejected -100 mesh material was also determined.

Initially the assays were done chemically to calibrate the x-ray analyzer. All assays were then conducted on the x-ray analyzer. It soon became apparent that due to dissolution and product attrition, the assays were not sufficient to determine product split by material balance calculations, therefore, provision was made to measure the three product flow rates and also sample the combined product discharge (reconstituted feed).

Screen analysis and heavy liquid separation were performed on selected retained samples.

* WI contain a variety of elements so the x-ray is used to determine the Si content which is proportional to the WI content. The gavimetric method of determination was leaching to remove all solubles and the remaining material is WI be definition.

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 12 SEPTEMBER 1987

| Test No. | Product | Weight TPH | Weight % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI | Media Specific Gravity (Marcy) $F_1$- | $F_2$- | $S_1$- | $S_2$- | F | Pressure (PSI) $F_1$ | $F_2$ | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Concentrate | | | 91.0 | 0.3 | | | | | | | | | | | | |
| | Middlings | | | 9.7 | 1.0 | | | | | | | | | | | | |
| | Tails | | | 4.7 | 3.9 | | | • | | 2.03 | 1.97 | 2.17 | 2.11 | 1.78 | 12 | 15 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 2 | Concentrate | | | 95.0 | 0.3 | | | | | | | | | | | | |
| | Middlings | | | 60.8 | 1.0 | | | | | | | | | | | | |
| | Tails | | | 6.7 | 3.9 | | | | | 2.03 | 1.90 | 2.16 | 2.07 | 1.70 | 12 | 20 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 4 | Concentrate | | | 66.6 | 0.9 | | | | | | | | | | | | |
| | Middlings | | | 6.3 | 3.1 | | | | | | | | | | | | |
| | Tails | | | 4.2 | 5.2 | | | | | 2.06 | 2.07 | 2.21 | 2.17 | 1.83 | 12 | 14 | 34 |
| | Head | | | | | | | | | | | | | | | | |
| 6 | Concentrate | | | 82.4 | 0.5 | | | | | | | | | | | | |
| | Middlings | | | 8.3 | 1.6 | | | | | | | | | | | | |
| | Tails | | | 4.3 | 7.3 | | | | | 2.11 | 1.98 | 2.24 | 2.14 | 1.83 | 11 | 19 | 34 |
| | Head | | | | | | | | | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 1

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 14 SEPTEMBER 1987

| Test No. | Product | Weight TPH | Weight % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI | Media Specific Gravity (Marcy) $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | Pressure (PSI) $F_1$ | $F_2$ | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Concentrate | | | 69.1 | 0.8 | | | | | | | | | | | | |
| | Middlings | | | 4.5 | 0.8 | | | | | | | | | | | | |
| | Tails | | | 5.0 | 6.5 | | | | | 2.13 | 2.01 | 2.25 | 2.14 | 1.85 | 12 | 16 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 2 | Concentrate | | | 92.2 | 0.4 | | | | | | | | | | | | |
| | Middlings | | | 30.6 | 1.4 | | | | | | | | | | | | |
| | Tails | | | 5.1 | 5.9 | | | | | 2.11 | 1.92 | 2.23 | 2.11 | 1.69 | 12 | 18 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 3 | Concentrate | | | 92.2 | 0.4 | | | | | | | | | | | | |
| | Middlings | | | 31.6 | 1.2 | | | | | | | | | | | | |
| | Tails | | | 5.2 | 6.8 | | | | | 2.12 | 1.88 | 2.23 | 2.08 | 1.66 | 12 | 22 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 4 | Concentrate | | | 87.9 | 0.5 | | | | | | | | | | | | |
| | Middlings | | | 15.6 | 1.4 | | | | | | | | | | | | |
| | Tails | | | 5.4 | 7.1 | | | | | 2.15 | 1.90 | 2.28 | 2.07 | 1.79 | 12 | 18 | 30 |
| | Head | | | | | | | | | | | | | | | | |
| 5 | Concentrate | | | 79.6 | 0.6 | | | | | | | | | | | | |
| | Middlings | | | 8.7 | 1.6 | | | | | | | | | | | | |
| | Tails | | | 5.3 | 11.4 | | | | | 2.16 | 1.96 | 2.29 | 2.16 | 1.79 | 12 | 16 | 32 |
| | Head | | | | | | | | | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 2

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 15 SEPTEMBER 1987

| Test No. | Product | Weight TPH | Weight % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI | Media Specific Gravity (Marcy) $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | Pressure (PSI) $F_1$ | $F_2$ | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Concentrate | | | | | | | | | | | | | | | | |
| | Middlings | | | | | | | | | | | | | | | | |
| | Tails | | | | | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |
| 2 | Concentrate | | | 91.5 | 0.4 | | | | | | | | | | | | |
| | Middlings | | | 24.6 | 1.3 | | | | | | | | | | | | |
| | Tails | | | 3.2 | 6.8 | | | | | 2.19 | 1.89 | 2.31 | 2.04 | 1.76 | 16 | 17 | 32 |
| | Head | | | | | | | | | | | | | | | | |
| 3 | Concentrate | | | 88.3 | 0.6 | | | | | | | | | | | | |
| | Middlings | | | 9.8 | 1.8 | | | | | | | | | | | | |
| | Tails | | | 3.1 | 8.2 | | | | | 2.18 | 1.94 | 2.31 | 2.09 | 1.79 | 16 | 17 | 20 |
| | Head | | | | | | | | | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 3

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 16 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 1 | Concentrate | | | 95.5 | 0.3 | | | | | | | | | | | | |
| | Middlings | | | 59.5 | 1.6 | | | | | 2.06 | 1.93 | 2.22 | 2.11 | 1.62 | | | 32 |
| | Tails | | | 5.8 | 4.4 | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |
| 2 | Concentrate | | | 96.6 | 0.3 | | | | | | | | | | | | |
| | Middlings | | | 57.7 | 1.7 | | | | | 2.08 | 1.93 | 2.24 | 2.08 | 1.69 | | | 32 |
| | Tails | | | 16.2 | 4.1 | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |
| 3 | Concentrate | | | 96.9 | 0.2 | | | | | | | | | | | | |
| | Middlings | | | 54.8 | 1.8 | | | | | 2.05 | 1.93 | 2.22 | 2.09 | 1.64 | | | 32 |
| | Tails | | | 20.2 | 3.6 | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |
| 4 | Concentrate | | | 96.5 | 0.3 | | | | | | | | | | | | |
| | Middlings | | | 51.8 | 2.0 | | | | | 2.01 | 1.96 | 2.23 | 2.12 | 1.59 | | | 32 |
| | Tails | | | 14.1 | 4.5 | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |
| 5 | Concentrate | | | 95.1 | 0.5 | | | | | | | | | | | | |
| | Middlings | | | 17.6 | 2.3 | | | | | 2.06 | 1.99 | 2.20 | 2.16 | 1.73 | | | 32 |
| | Tails | | | 5.9 | 4.5 | | | | | | | | | | | | |
| | Head | | | | | | | | | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 4

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 19 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 1 | Concentrate | 1.23 | 31.1 | 96.2 | 0.4 | 29.9 | 0.1 | 84.0 | 3.0 | | | | | | | | |
| | Middlings | 0.34 | 8.6 | 20.9 | 2.0 | 1.8 | 0.2 | 5.0 | 6.1 | | | | | | | | |
| | Tails | 2.38 | 60.3 | 6.4 | 5.0 | 3.9 | 3.0 | 11.0 | 90.9 | 2.06 | 1.96 | 2.21 | 2.09 | 1.74 | 29 | 18 | 32 |
| | Head | 3.95 | 100.0 | | | 35.6 | 3.3 | 100.0 | 100.0 | | | | | | | | |
| 2 | Concentrate | 1.02 | 26.2 | 95.9 | 0.5 | 25.1 | 0.1 | 81.3 | 2.6 | | | | | | | | |
| | Middlings | 0.32 | 8.2 | 18.0 | 2.4 | 1.5 | 0.2 | 4.8 | 5.3 | | | | | | | | |
| | Tails | 2.56 | 65.6 | 6.6 | 5.4 | 4.3 | 3.5 | 13.9 | 92.1 | 2.06 | 1.97 | 2.22 | 2.10 | 1.76 | 28 | 18 | 32 |
| | Head | 3.90 | 100.0 | | | 30.9 | 3.8 | 100.0 | 100.0 | | | | | | | | |
| 3 | Concentrate | 0.37 | 11.5 | 97.9 | 0.2 | 11.3 | 0.0 | 32.5 | 0.0 | | | | | | | | |
| | Middlings | 0.76 | 23.5 | 72.7 | 1.3 | 17.1 | 0.3 | 49.1 | 10.7 | | | | | | | | |
| | Tails | 2.10 | 65.0 | 9.9 | 3.9 | 6.4 | 2.5 | 18.4 | 89.3 | 2.07 | 1.94 | 2.24 | 2.11 | 1.66 | 28 | 22 | 32 |
| | Head | 3.23 | 100.0 | | | 34.8 | 2.8 | 100.0 | 100.0 | | | | | | | | |
| 4 | Concentrate | 0.48 | 16.2 | 97.0 | 0.2 | 15.7 | 0.0 | 43.4 | 0.0 | | | | | | | | |
| | Middlings | 0.73 | 24.6 | 65.3 | 1.1 | 16.1 | 0.3 | 44.5 | 11.1 | | | | | | | | |
| | Tails | 1.76 | 59.2 | 7.4 | 4.1 | 4.4 | 2.4 | 12.1 | 88.9 | 2.06 | 1.94 | 2.25 | 2.11 | 1.66 | 29 | 20 | 32 |
| | Head | 2.97 | 100.0 | | | 36.2 | 2.7 | 100.0 | 100.0 | | | | | | | | |
| 5 | Concentrate | 0.45 | 14.0 | 96.9 | 0.3 | 13.6 | 0.0 | 32.0 | 0.0 | | | | | | | | |
| | Middlings | 1.29 | 40.2 | 65.1 | 1.0 | 26.2 | 0.4 | 61.6 | 19.0 | | | | | | | | |
| | Tails | 1.47 | 45.8 | 6.0 | 3.8 | 2.7 | 1.7 | 6.4 | 81.0 | 2.07 | 1.96 | 2.24 | 2.15 | 1.68 | 24 | 27 | 32 |
| | Head | 3.21 | 100.0 | | | 42.5 | 2.1 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 5

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 19 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 6 | Concentrate | 0.74 | 27.2 | 95.3 | 0.3 | 25.9 | 0.1 | 71.4 | 3.6 | | | | | | | | |
| | Middlings | 0.70 | 25.7 | 31.0 | 1.6 | 8.0 | 0.4 | 22.0 | 14.3 | 2.10 | 1.98 | 2.25 | 2.18 | 1.73 | 24 | 27 | 32 |
| | Tails | 1.28 | 47.1 | 5.0 | 4.9 | 2.4 | 2.3 | 6.6 | 82.1 | | | | | | | | |
| | Head | 2.72 | 100.0 | | | 36.3 | 2.8 | 100.0 | 100.0 | | | | | | | | |
| 7 | Concentrate | 0.47 | 24.6 | 96.2 | 0.4 | 23.7 | 0.1 | 74.3 | 2.4 | | | | | | | | |
| | Middlings | 0.29 | 15.2 | 34.5 | 2.2 | 5.2 | 0.3 | 16.3 | 7.3 | 2.12 | 2.01 | 2.26 | 2.17 | 1.75 | 24 | 30 | 32 |
| | Tails | 1.15 | 60.2 | 5.0 | 6.1 | 3.0 | 3.7 | 9.4 | 90.3 | | | | | | | | |
| | Head | 1.91 | 100.0 | | | 31.9 | 4.1 | 100.0 | 100.0 | | | | | | | | |
| 8 | Concentrate | 0.27 | 13.5 | 98.1 | 0.3 | 13.2 | 0.0 | 41.1 | 0.0 | | | | | | | | |
| | Middlings | 0.53 | 26.5 | 59.6 | 1.1 | 15.8 | 0.3 | 49.2 | 9.7 | 2.14 | 1.97 | 2.26 | 2.15 | 1.71 | 25 | 30 | 32 |
| | Tails | 1.20 | 60.0 | 5.1 | 4.7 | 3.1 | 2.8 | 9.7 | 90.3 | | | | | | | | |
| | Head | 2.00 | 100.0 | | | 32.1 | 3.1 | 100.0 | 100.0 | | | | | | | | |
| 9 | Concentrate | 0.68 | 36.8 | 90.7 | 0.7 | 33.4 | 0.3 | 91.0 | 7.1 | | | | | | | | |
| | Middlings | 0.30 | 16.2 | 7.3 | 2.1 | 1.2 | 0.3 | 3.3 | 7.1 | 2.15 | 2.08 | 2.29 | 2.21 | 1.86 | 22 | 22 | 32 |
| | Tails | 0.87 | 47.0 | 4.4 | 7.7 | 2.1 | 3.6 | 5.7 | 85.8 | | | | | | | | |
| | Head | 1.85 | 100.0 | | | 36.7 | 4.2 | 100.0 | 100.0 | | | | | | | | |
| 10 | Concentrate | 0.63 | 32.3 | 94.0 | 0.5 | 30.4 | 0.2 | 85.9 | 5.1 | | | | | | | | |
| | Middlings | 0.32 | 16.4 | 17.2 | 1.7 | 2.8 | 0.3 | 7.9 | 7.7 | 2.15 | 2.04 | 2.28 | 2.19 | 1.80 | 24 | 25 | 32 |
| | Tails | 1.00 | 51.3 | 4.3 | 6.7 | 2.2 | 3.4 | 6.2 | 87.2 | | | | | | | | |
| | Head | 1.95 | 100.0 | | | 35.4 | 3.9 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 5A

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 21 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$- | $F_2$- | $S_1$- | $S_2$- | F | $F_1$ | $F_2$ | C |
| 1 | Concentrate | 2.94 | 42.5 | 78.0 | 0.6 | 33.2 | 0.3 | 91.7 | 9.4 | | | | | | | | |
| | Middlings | 2.38 | 34.4 | 5.9 | 2.4 | 2.0 | 0.8 | 5.5 | 25.0 | 2.14 | 2.03 | 2.29 | 2.20 | 1.74 | 24 | 26 | 32 |
| | Tails | 1.59 | 23.1 | 4.4 | 8.9 | 1.0 | 2.1 | 2.8 | 65.6 | | | | | | | | |
| | Head | 6.91 | 100.0 | | | 36.2 | 3.2 | 100.0 | 100.0 | | | | | | | | |
| 2 | Concentrate | 3.05 | 47.6 | 76.8 | 0.7 | 36.6 | 0.3 | 93.8 | 10.3 | | | | | | | | |
| | Middlings | 1.74 | 27.2 | 5.2 | 1.9 | 1.4 | 0.5 | 3.6 | 17.2 | 2.14 | 2.00 | 2.29 | 2.16 | 1.79 | | | |
| | Tails | 1.61 | 25.2 | 4.1 | 8.3 | 1.0 | 2.1 | 2.6 | 72.5 | | | | | | | | |
| | Head | 6.40 | 100.0 | | | 39.0 | 2.9 | 100.0 | 100.0 | | | | | | | | |
| 3 | Concentrate | 1.87 | 33.1 | 92.4 | 0.6 | 30.6 | 0.2 | 80.1 | 6.1 | | | | | | | | |
| | Middlings | 1.83 | 32.4 | 18.6 | 2.4 | 6.0 | 0.8 | 15.7 | 24.2 | 2.14 | 2.00 | 2.30 | 2.16 | 1.69 | 28 | 20 | 32 |
| | Tails | 1.95 | 34.5 | 4.6 | 6.6 | 1.6 | 2.3 | 4.2 | 69.7 | | | | | | | | |
| | Head | 5.65 | 100.0 | | | 38.2 | 3.3 | 100.0 | 100.0 | | | | | | | | |
| 4 | Concentrate | 2.48 | 41.6 | 80.0 | 0.6 | 33.3 | 0.2 | 89.3 | 5.9 | | | | | | | | |
| | Middlings | 1.69 | 28.3 | 8.6 | 2.0 | 2.4 | 0.6 | 6.4 | 17.6 | 2.16 | 2.00 | 2.31 | 2.15 | 1.75 | 30 | 18 | 32 |
| | Tails | 1.79 | 30.1 | 5.2 | 8.5 | 1.6 | 2.6 | 4.3 | 76.5 | | | | | | | | |
| | Head | 5.96 | 100.0 | | | 37.3 | 3.4 | 100.0 | 100.0 | | | | | | | | |
| 5 | Concentrate | 2.60 | 39.9 | 88.2 | 0.6 | 35.2 | 0.2 | 88.0 | 6.7 | | | | | | | | |
| | Middlings | 1.64 | 25.2 | 12.2 | 2.4 | 3.1 | 0.6 | 7.8 | 20.0 | 2.15 | 1.98 | 2.30 | 2.14 | 1.80 | 30 | 17 | 30 |
| | Tails | 2.27 | 34.9 | 5.0 | 6.3 | 1.7 | 2.2 | 4.2 | 73.3 | | | | | | | | |
| | Head | 6.51 | 100.0 | | | 40.0 | 3.0 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 6

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 21 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 6 | Concentrate | 2.13 | 34.9 | 93.4 | 0.4 | 32.6 | 0.1 | 78.9 | 3.7 | | | | | | | | |
| | Middlings | 1.49 | 24.4 | 29.1 | 2.0 | 7.1 | 0.5 | 17.2 | 18.5 | 2.15 | 1.96 | 2.30 | 2.13 | 1.70 | 30 | 18 | 32 |
| | Tails | 2.48 | 40.7 | 4.0 | 5.1 | 1.6 | 2.1 | 3.9 | 77.8 | | | | | | | | |
| | Head | 6.10 | 100.0 | | | 41.3 | 2.7 | 100.0 | 100.0 | | | | | | | | |
| 7 | Concentrate | 2.61 | 40.7 | 87.3 | 0.6 | 35.5 | 0.2 | 91.5 | 6.9 | | | | | | | | |
| | Middlings | 1.28 | 19.9 | 7.9 | 2.2 | 1.6 | 0.4 | 4.1 | 13.8 | 2.13 | 1.98 | 2.29 | 2.13 | 1.81 | 29 | 16 | 32 |
| | Tails | 2.53 | 39.4 | 4.3 | 5.8 | 1.7 | 2.3 | 4.4 | 79.3 | | | | | | | | |
| | Head | 6.42 | 100.0 | | | 38.8 | 2.9 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 6A

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 22 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 1 | Concentrate | 1.54 | 26.4 | 89.1 | 0.4 | 23.5 | 0.1 | 62.5 | 2.9 | | | | | | | | |
| | Middlings | 2.71 | 46.4 | 26.9 | 2.0 | 12.5 | 0.9 | 33.2 | 26.5 | 2.17 | 1.95 | | | | 28 | 17 | 32 |
| | Tails | 1.59 | 27.2 | 5.7 | 8.8 | 1.6 | 2.4 | 4.3 | 70.6 | | | | | | | | |
| | Head | 5.84 | 100.0 | | | 37.6 | 3.4 | 100.0 | 100.0 | | | | | | | | |
| 2 | Concentrate | 2.12 | 36.4 | 83.7 | 0.4 | 30.5 | 0.1 | 83.3 | 3.8 | | | | | | | | |
| | Middlings | 2.73 | 46.8 | 10.7 | 2.0 | 5.0 | 0.9 | 13.7 | 34.6 | 2.17 | 1.96 | | | | 28 | 16 | 32 |
| | Tails | 0.98 | 16.8 | 6.6 | 9.5 | 1.1 | 1.6 | 3.0 | 61.6 | | | | | | | | |
| | Head | 5.83 | 100.0 | | | 36.6 | 2.6 | 100.0 | 100.0 | | | | | | | | |
| 3 | Concentrate | 2.54 | 43.3 | 85.2 | 0.5 | 36.9 | 0.2 | 86.2 | 9.5 | | | | | | | | |
| | Middlings | 2.29 | 39.0 | 12.5 | 1.7 | 4.9 | 0.7 | 11.4 | 33.3 | 2.17 | 1.96 | 2.30 | 2.13 | 1.80 | 28 | 17 | 32 |
| | Tails | 1.04 | 17.7 | 5.5 | 7.0 | 1.0 | 1.2 | 2.4 | 57.2 | | | | | | | | |
| | Head | 5.87 | 100.0 | | | 42.8 | 2.1 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 7

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 24 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 1 | Concentrate | 1.94 | 29.0 | 92.1 | 0.4 | 26.7 | 0.1 | 73.5 | 4.0 | | | | | | | | |
| | Middlings | 1.59 | 23.7 | 27.1 | 1.6 | 6.4 | 0.4 | 17.6 | 16.0 | 2.07 | 1.98 | | | | 28 | 20 | 30 |
| | Tails | 3.17 | 47.3 | 6.8 | 4.2 | 3.2 | 2.0 | 8.9 | 80.0 | | | | | | | | |
| | Head | 6.70 | 100.0 | | | 36.3 | 2.5 | 100.0 | 100.0 | | | | | | | | |
| 2 | Concentrate | 2.29 | 37.0 | 87.9 | 0.4 | 32.5 | 0.1 | 86.6 | 4.8 | | | | | | | | |
| | Middlings | 1.20 | 19.4 | 12.9 | 1.6 | 2.5 | 0.3 | 6.7 | 14.3 | 2.06 | 1.98 | | | | | | |
| | Tails | 2.70 | 43.6 | 5.7 | 4.0 | 2.5 | 1.7 | 6.7 | 80.9 | | | | | | | | |
| | Head | 6.19 | 100.0 | | | 37.5 | 2.1 | 100.0 | 100.0 | | | | | | | | |
| 3 | Concentrate | 2.90 | 45.1 | 83.4 | 0.4 | 37.6 | 0.2 | 90.8 | 8.7 | | | | | | | | |
| | Middlings | 0.98 | 15.2 | 8.8 | 1.7 | 1.3 | 0.3 | 3.2 | 13.0 | 2.06 | 1.98 | | | | 28 | 15 | 30 |
| | Tails | 2.55 | 39.7 | 6.2 | 4.6 | 2.5 | 1.8 | 6.0 | 78.3 | | | | | | | | |
| | Head | 6.43 | 100.0 | | | 41.4 | 2.3 | 100.0 | 100.0 | | | | | | | | |
| 4 | Concentrate | 1.76 | 27.7 | 93.1 | 0.3 | 25.8 | 0.1 | 60.1 | 4.0 | | | | | | | | |
| | Middlings | 1.62 | 25.5 | 55.2 | 1.2 | 14.1 | 0.3 | 32.9 | 12.0 | 2.03 | 1.94 | | | | | | |
| | Tails | 2.97 | 46.8 | 6.4 | 4.4 | 3.0 | 2.1 | 7.0 | 84.0 | | | | | | | | |
| | Head | 6.35 | 100.0 | | | 42.9 | 2.5 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 8

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 29 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 2 | Concentrate | 0.22 | 10.0 | 96.9 | 0.4 | 9.7 | 0.0 | 26.7 | 0.0 | | | | | | | | |
| | Middlings | 0.75 | 34.4 | 66.5 | 1.1 | 22.9 | 0.4 | 63.1 | 14.3 | 2.09 | 1.93 | | | | 27 | 28 | 32 |
| | Tails | 1.21 | 55.6 | 6.6 | 4.4 | 3.7 | 2.4 | 10.2 | 85.7 | | | | | | | | |
| | Head | 2.18 | 100.0 | | | 36.3 | 2.8 | 100.0 | 100.0 | | | | | | | | |
| 3 | Concentrate | 0.53 | 24.5 | 96.5 | 0.3 | 23.6 | 0.1 | 63.6 | 3.1 | | | | | | | | |
| | Middlings | 0.48 | 22.2 | 45.5 | 1.5 | 10.1 | 0.3 | 27.2 | 9.4 | 2.08 | 1.97 | | | | | | |
| | Tails | 1.15 | 53.3 | 6.3 | 5.3 | 3.4 | 2.8 | 9.2 | 87.5 | | | | | | | | |
| | Head | 2.16 | 100.0 | | | 37.1 | 3.2 | 100.0 | 100.0 | | | | | | | | |
| 4 | Concentrate | 0.68 | 29.8 | 95.8 | 0.3 | 28.5 | 0.1 | 76.4 | 3.3 | | | | | | | | |
| | Middlings | 0.43 | 18.9 | 30.4 | 2.0 | 5.7 | 0.4 | 15.3 | 13.3 | 2.09 | 2.01 | | | | 27 | 28 | 33 |
| | Tails | 1.17 | 51.3 | 6.1 | 4.8 | 3.1 | 2.5 | 8.3 | 83.4 | | | | | | | | |
| | Head | 2.28 | 100.0 | | | 37.3 | 3.0 | 100.0 | 100.0 | | | | | | | | |
| 5 | Concentrate | 0.86 | 38.2 | 92.8 | 0.5 | 35.4 | 0.2 | 89.4 | 6.9 | | | | | | | | |
| | Middlings | 0.31 | 13.8 | 12.8 | 2.1 | 1.8 | 0.3 | 4.5 | 10.3 | 2.10 | 2.03 | | | | | | |
| | Tails | 1.08 | 48.0 | 5.1 | 5.0 | 2.4 | 2.4 | 6.1 | 82.8 | | | | | | | | |
| | Head | 2.25 | 100.0 | | | 39.6 | 2.9 | 100.0 | 100.0 | | | | | | | | |
| 6 | Concentrate | 0.39 | 17.6 | 96.6 | 0.6 | 17.0 | 0.1 | 46.7 | 2.9 | | | | | | | | |
| | Middlings | 0.28 | 12.6 | 69.0 | 1.1 | 8.7 | 0.1 | 23.9 | 2.9 | 1.97 | 1.97 | | | | 21 | 23 | 32 |
| | Tails | 1.54 | 69.8 | 15.4 | 4.7 | 10.7 | 3.3 | 29.4 | 94.2 | | | | | | | | |
| | Head | 2.21 | 100.0 | | | 36.4 | 3.5 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 9

TRI-FLO SEPARATOR OPERATING RESULTS

SAMPLE DATE: 29 SEPTEMBER 1987

| Test No. | Product | Weight | | Assay | | Factor | | Distribution | | Media Specific Gravity (Marcy) | | | | | Pressure (PSI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TPH | % | KCl | WI | KCl | WI | KCl | WI | $F_1$ | $F_2$ | $S_1$ | $S_2$ | F | $F_1$ | $F_2$ | C |
| 7 | Concentrate | 0.55 | 24.2 | 96.7 | 0.4 | 23.4 | 0.1 | 66.7 | 3.4 | | | | | | | | |
| | Middlings | 0.29 | 12.8 | 41.8 | 1.7 | 5.4 | 0.2 | 15.4 | 6.9 | 2.00 | 2.00 | | | | | | |
| | Tails | 1.43 | 63.0 | 10.0 | 4.1 | 6.3 | 2.6 | 17.9 | 89.7 | | | | | | | | |
| | Head | 2.27 | 100.0 | | | 35.1 | 2.9 | 100.0 | 100.0 | | | | | | | | |
| 8 | Concentrate | 0.82 | 39.0 | 91.1 | 0.6 | 35.5 | 0.2 | 88.8 | 6.7 | | | | | | | | |
| | Middlings | 0.24 | 11.4 | 11.8 | 1.9 | 1.3 | 0.2 | 3.2 | 6.7 | 2.04 | 2.03 | | | | 20 | 17 | 32 |
| | Tails | 1.04 | 49.6 | 6.4 | 5.3 | 3.2 | 2.6 | 8.0 | 86.6 | | | | | | | | |
| | Head | 2.10 | 100.0 | | | 40.0 | 3.0 | 100.0 | 100.0 | | | | | | | | |

NOTE: $F_1$ = Feed 1; $F_2$ = Feed 2; C = Cyclone Feed; $S_1$ = Tails; $S_2$ = Middlings; F = Concentrate

TABLE 9A

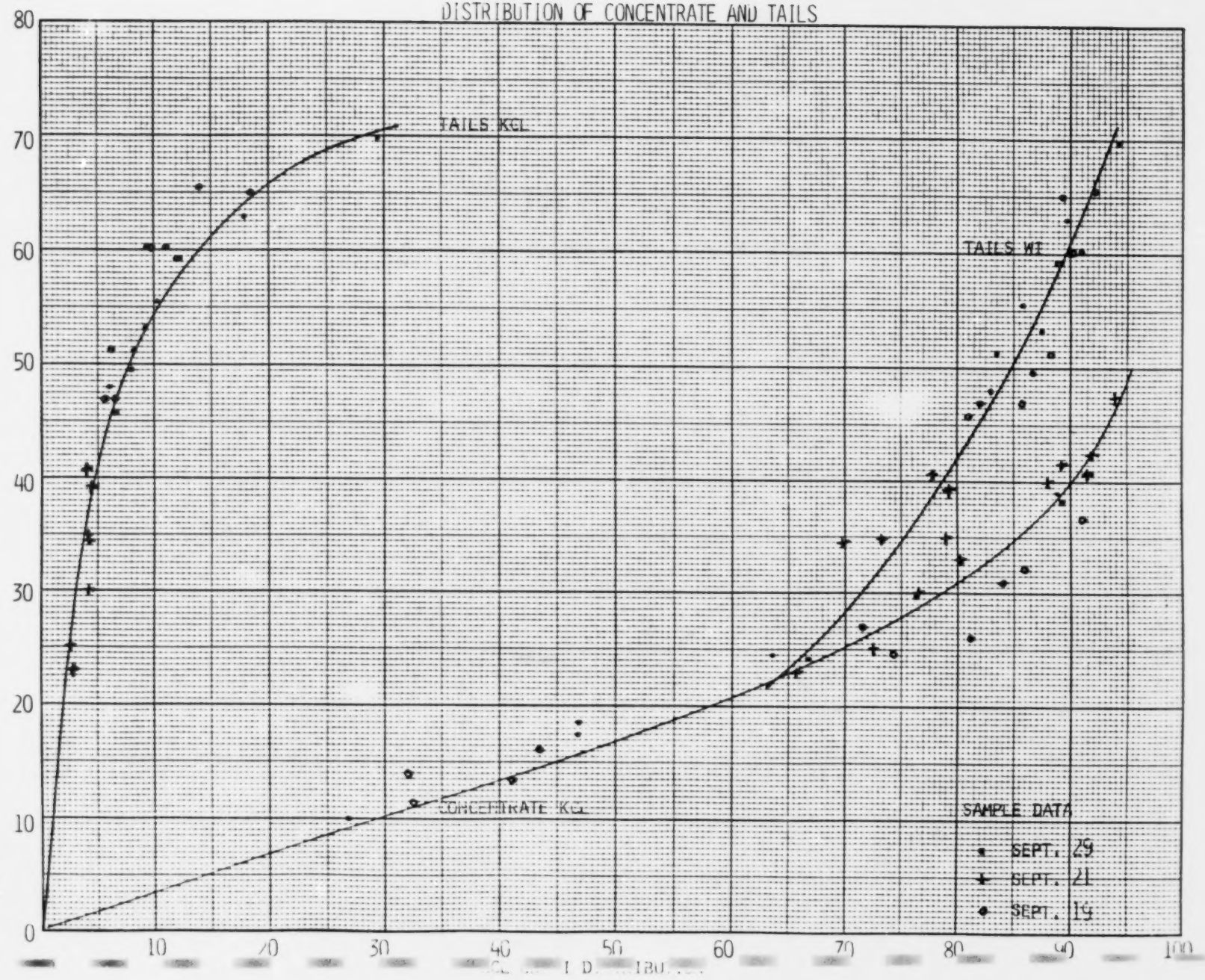

DISTRIBUTION OF CONCENTRATE AND TAILS
TAILS KGL
TAILS WT
CONCENTRATE KGL
SAMPLE DATA
SEPT. 29
SEPT. 21
SEPT. 14
WEIGHT DISTRIBUTION
0
10
20
30
40
50
60
70
80
90
100

FIG. 1

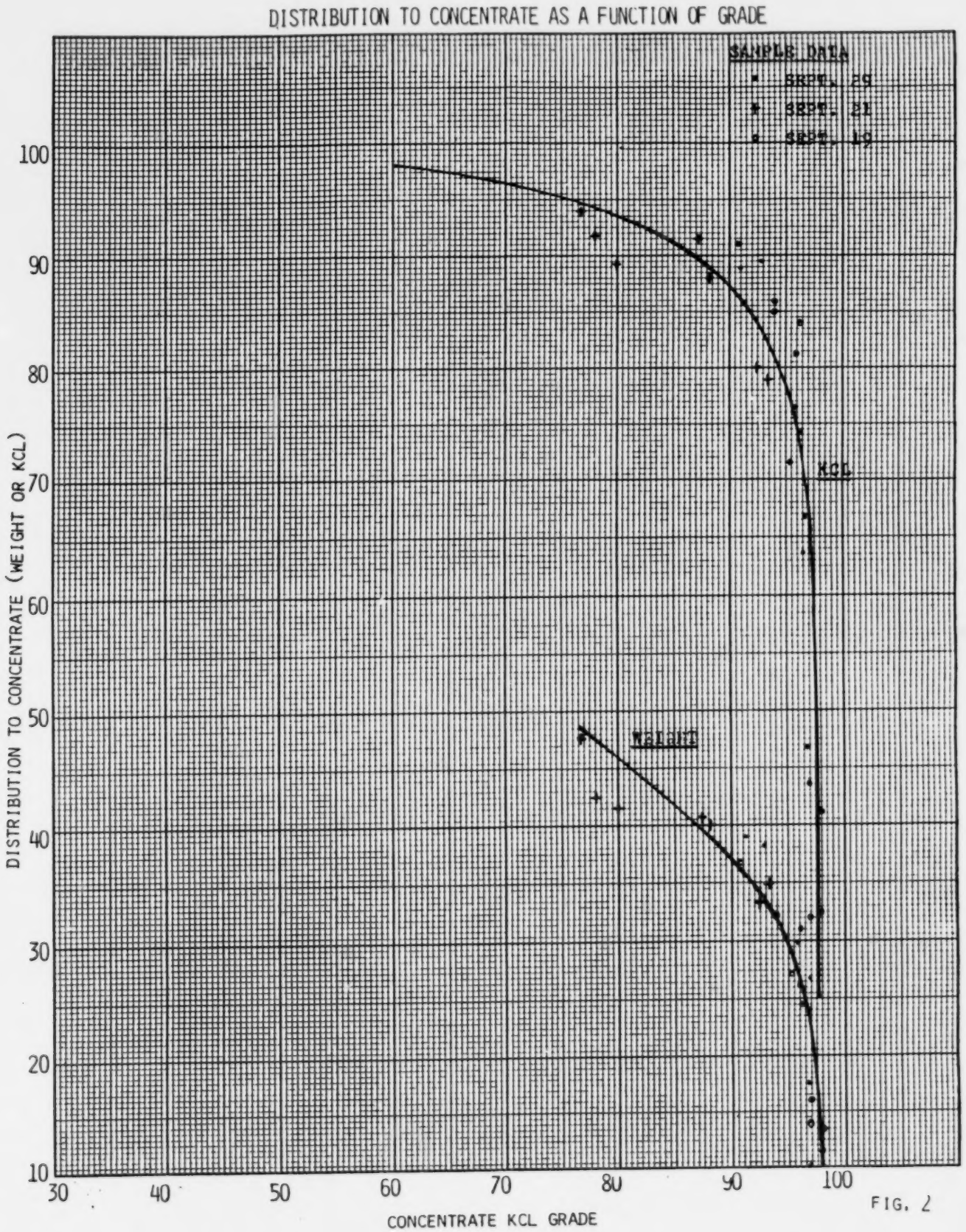

DISTRIBUTION TO CONCENTRATE AS A FUNCTION OF GRADE
SAMPLE DATA
SEPT. 29
SEPT. 21
SEPT. 19
KCL
WEIGHT
DISTRIBUTION TO CONCENTRATE (WEIGHT OR KCL)
CONCENTRATE KCL GRADE
100
90
80
70
60
50
40
30
20
10
30
40
50
60
70
80
90
100

FIG. 2

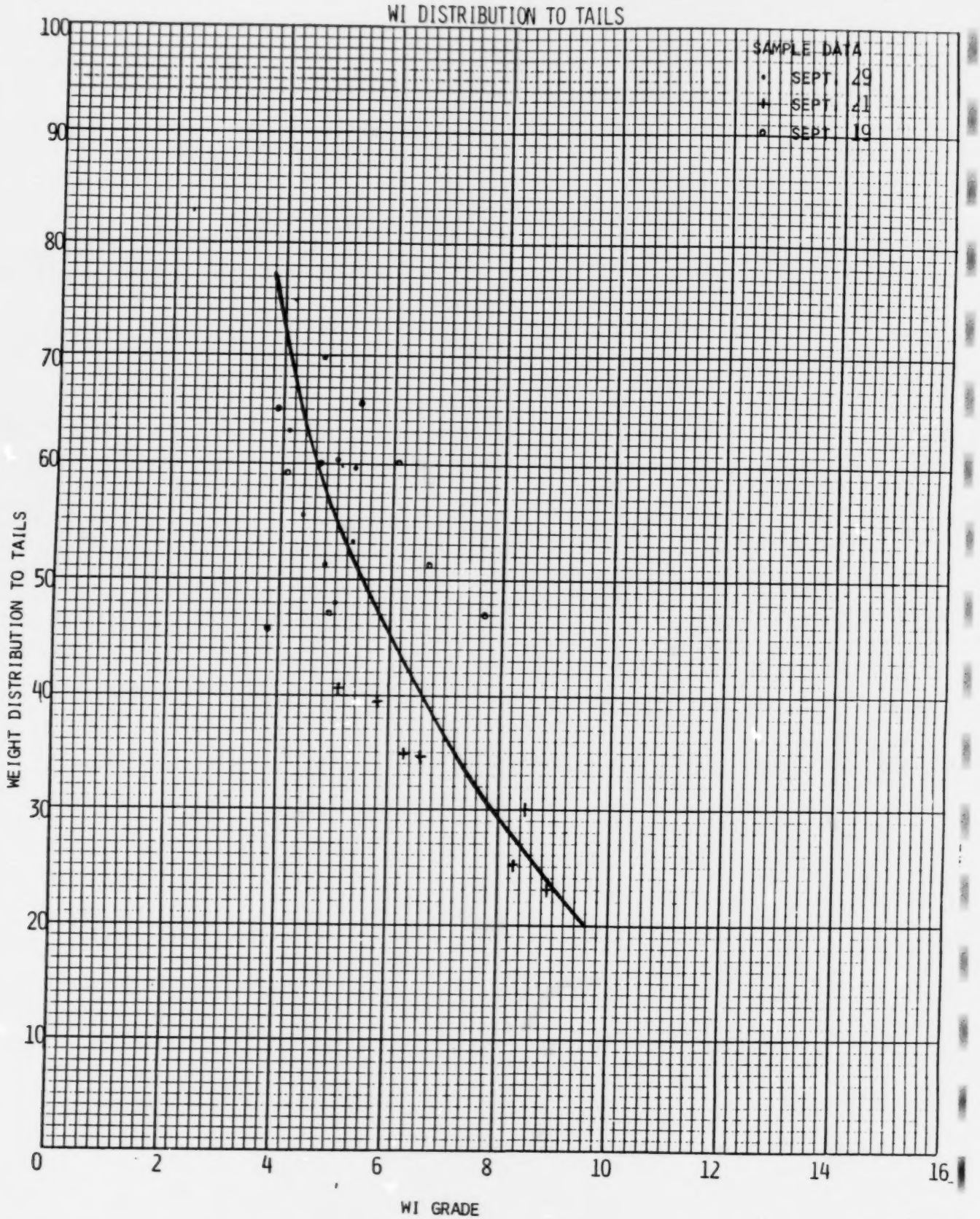

WI DISTRIBUTION TO TAILS
SAMPLE DATA
• SEPT 29
+ SEPT 21
○ SEPT 19
WEIGHT DISTRIBUTION TO TAILS
WI GRADE
100
90
80
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
16

FIG. 3

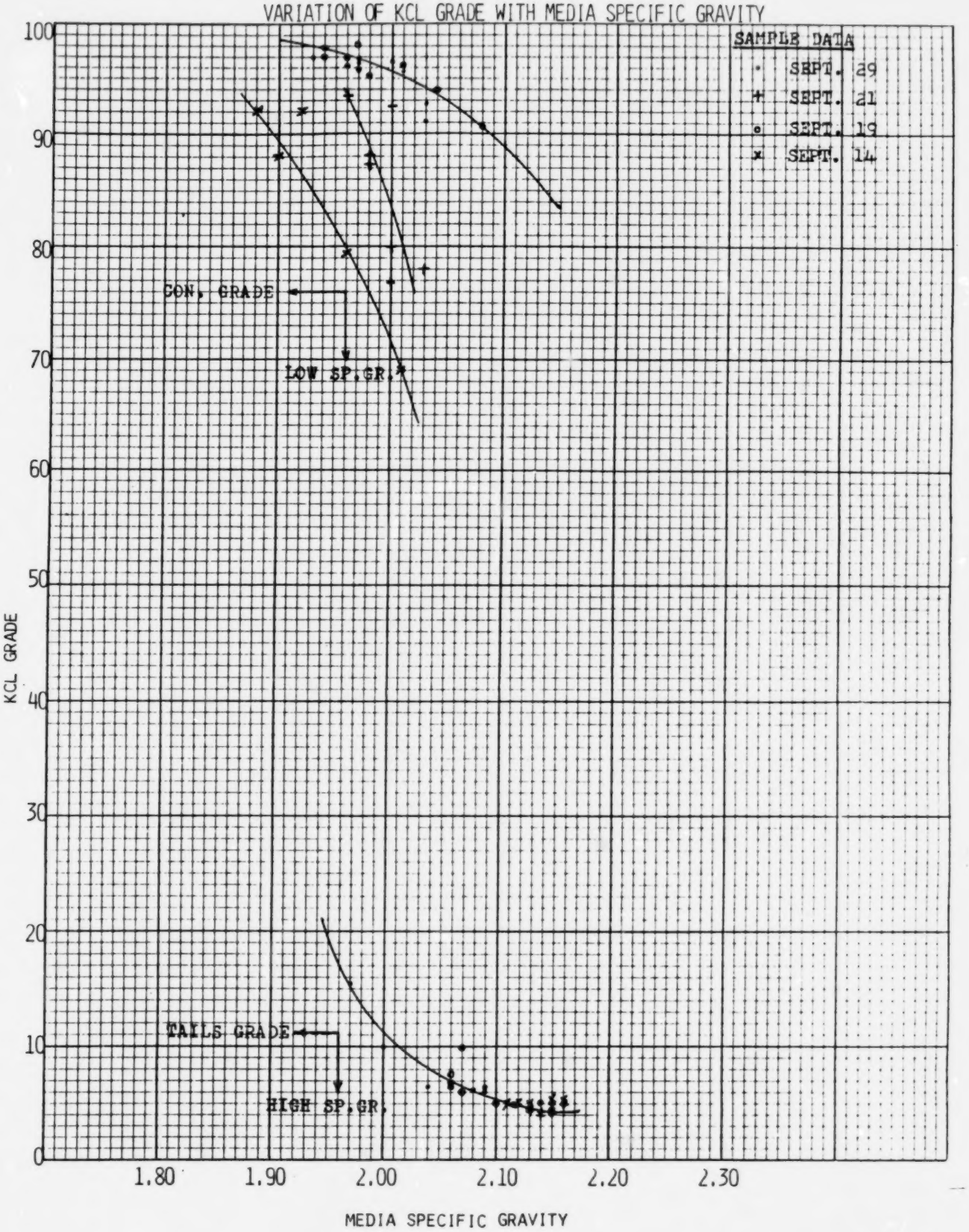

VARIATION OF KCL GRADE WITH MEDIA SPECIFIC GRAVITY
SAMPLE DATA
SEPT. 29
SEPT. 21
SEPT. 19
SEPT. 14
CON. GRADE
LOW SP.GR.
TAILS GRADE
HIGH SP.GR.
KCL GRADE
MEDIA SPECIFIC GRAVITY
100
90
80
70
60
50
40
30
20
10
0
1.80
1.90
2.00
2.10
2.20
2.30

FIG. 4

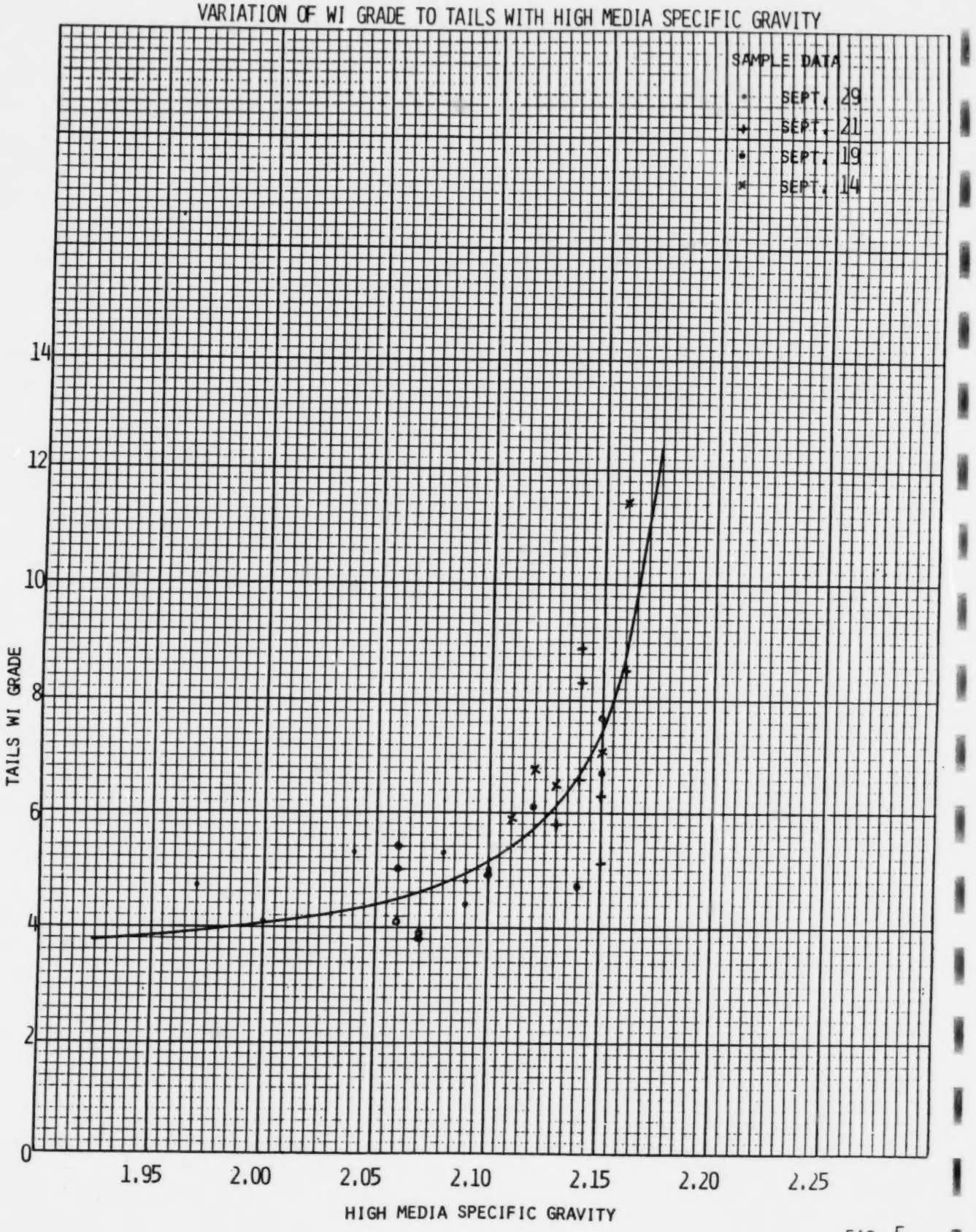

VARIATION OF WI GRADE TO TAILS WITH HIGH MEDIA SPECIFIC GRAVITY
SAMPLE DATA
SEPT. 29
SEPT. 21
SEPT. 19
SEPT. 14
TAILS WI GRADE
0
2
4
6
8
10
12
14
1.95
2.00
2.05
2.10
2.15
2.20
2.25
HIGH MEDIA SPECIFIC GRAVITY

FIG. 5

# APPENDIX II

## OPERATING PROBLEMS

(A) BRINE PROBLEMS

(B) DENSITY INDICATOR DRIFT

(C) MEDIA TYPE

(D) MEDIA CONTAMINATION

## (A) BRINE PROBLEMS

Cooling of the plant brine in the outdoor location of the pilot plant caused dissolved materials to crystallize out and resulted in the Deister screen blinding off rapidly. Plant brine also created a serious froth problem in the media pump boxes due to the quantity of flotation reagents recycled in the brine.

The blinding problem was resolved by switching from plant brine to the unsaturated reclaim brine supply. With conversion of the brine to the reclaim supply, the froth problem was reduced, but about 0.3 US gallons per hour of MIBC still had to be used to reduce frothing.

Use of reclaim brine which is under-saturated in both KCl and NaCl resulted in dissolution of feed material and liberation of clay, creating problems in calculating material balances and media contamination.

## (B) DENSITY INDICATOR DRIFT

The gamma gauges proved to be unreliable in this application (probably due to entrained froth in the media).

The controller action was also abrupt and erratic at times.

In order that density readings were consistent, Marcy gauge readings are used for evaluation of results.

## (C) MEDIA TYPE

Initially the system was charged with two tons of magnetite (Magnafloat, Grade B - Foote Mineral Co.) in circuit brine medium. With the plant at steady state, various media specific gravities were as follows:

| | | |
|---|---|---|
| High Media Feed | 2.05 | Indicated |
| Low Media Feed | 1.95 | Indicated |
| $Sink_1$ Media (tails) | 2.19 | Marcy Gauge |
| $Sink_2$ Media (middlings) | 2.14 | Marcy Gauge |
| Float Media (concentrate) | 2.05 | Marcy Gauge |

Normal operating practice for the Tri-Flo requires that the differential between $Sink_2$ and Float specific gravity be in the range of 0.3 to 0.6. The measured differential in the pilot plant of 0.09 was deemed to be unsatisfactory for steady operation. A coarser grade of magnetite or a magnetite/ferrosilicon blend was required to correct the problem. Due to its availability, ferrosilicon was chosen and 0.6 tons was charged to the media remaining in the system.

With the plant at steady state, using the magnetite/ferrosilicon blend, media specific gravities were as follows:

| | | |
|---|---|---|
| High Media Feed | 2.05 | Indicated |
| Low Media Feed | 1.95 | Indicated |
| $Sink_1$ Media (tails) | 2.16 | Marcy Gauge |
| $Sink_2$ Media (middlings) | 2.07 | Marcy Gauge |
| Float Media (concentrate) | 1.70 | Marcy Gauge |

A satisfactory specific gravity differential between $Sink_2$ and Float of 0.37 had been achieved.

Further media charging was maintained at about 100 pounds magnetite to 30 pounds ferrosilicon.

## (D) MEDIA CONTAMINATION

During the period September 12th to 21st, the Tri-Flo separator was fed on an intermittent basis as feed was shut off after about 20 minutes to measure the product media densities and change feed media densities. Feed rate was usually kept at 5 to 7 tons per hour for these tests.

An attempt was made to maintain the plant at a steady state separation for several hours, starting on September 22nd, 1987. With feed at 7 tons per hour, it was found that the product split was changing continually (with a larger amount of material reporting to the float over time). This happened even when media feed specific gravities remained constant as seen by the results from September 24th (see Appendix I, Table 8). Both media feed specific gravities had to be reduced by 0.04 to bring the Tri-Flo separator back to the separation achieved during the first 20 minutes of feed.

This is believed to be the effect of viscosity increase in the media brought on by an accumulation of contaminants. The increase in media viscosity enables near gravity material to report to the float. It was observed that there was a build up in the clay content of the media and also an increase in media frothiness after the feed was on for about 15 to 20 minutes.

Non-magnetic particles smaller than the 40 mesh aperture of the Deister screen, contaminates the media. These fines originate mainly from three sources:

(a) fines in the feed
(b) fines generated in the Tri-Flo through attrition
(c) clay liberated due to dissolution of KCl and NaCl feed

The media is cleaned by passing cyclone overflow through the magnetic separator and discarding the non-magnetics with the effluent.

In the pilot plant system it was found that if the feed rate was reduced to about 3.0 tons per hour and almost all the cyclone overflow was passed through the magnetic separator, the media cleaning system was able to keep contaminant levels at an acceptable value for continuous operation.

# APPENDIX III

## DATA ON TRI-FLO FEED


| | |
|---|---|
| Table 1 | Overall Material Balance |
| Table 2 | Dissolution Loss Calculation |
| Table 3 | Feed and Discharge - Assays and Tonnages |
| Table 4 | Feed Screen Analysis |
| Table 5 | Feed Breakdown Data |

TABLE 1

## OVERALL MATERIAL BALANCE

Initial attempts at material balance based on assays of KCl and WI of solid phase feed and discharge streams from the Tri-Flo separator were not successful.

When arrangements were made to measure feed and discharge streams of the Tri-Flo, it became apparent that the sum of the solids discharge streams was considerably less than the feed. This discrepancy is due to dissolution of KCl and NaCl in the unsaturated reclaim brine and discharge of fine non-magnetic particles (KCl, NaCl and WI) with the magnetic separator effluent discharge.

Following is a summary of the daily overall solids material balance and accounts for dissolution and attrition losses.

MATERIALS BALANCE SUMMARY — DAILY AVERAGES

| Date | Feed tph | Discharge tph | "Loss" tph | Dissolution tph | Effluent Solids tph | Accounted Losses tph |
|---|---|---|---|---|---|---|
| September 12 | 5 | X | X | X | X | X |
| 14 | 5 | X | X | X | X | X |
| 15 | 5 | X | X | X | X | X |
| 16 | 5 | X | X | X | X | X |
| 19 | 3.4 | 2.8 | 0.6 | X | X | X |
| 21 | 6.9 | 6.3 | 0.6 | X | X | X |
| 22 | 6.7 | 5.9 | 0.8 | X | X | X |
| 24 | 7.2 | 6.4 | 0.8 | 0.77 | 0.11 | 0.88 |
| 29 | 3.0 | 2.2 | 0.8 | 0.81 | 0.21 | 1.02 |

X = no measurement

Detailed calculations and results are included.

TABLE 2

## DISSOLUTION LOSS CALCULATION

The magnetic separator effluent was monitored on September 24th and 29th to estimate dissolution losses.

The effluent flow rate was measured under steady state conditions before feed on time. The effluent was sampled before feed on and prior to feed off time. The samples were filtered and the filtrate was assayed.

(A) Sample Date: 24th September 1987

Effluent flow rate = 60 gpm (US) = 18.0 tons per hour

| Sample Data | Time | Temp. °F | Assay KCl | Assay NaCl | Solids Wt. % |
|---|---|---|---|---|---|
| Start | 11:15 AM | 73 | 7.3 | 19.6 | 0.2 |
| Finish | 3:40 PM | 73 | 9.1 | 20.6 | 0.8 |

(B) Sample Date: 29th September 1987

Effluent flow rate = 60 gpm (US) = 18.0 tons per hour

| Sample Data | Time | Temp. °F | Assay KCl | Assay NaCl | Solids Wt. % |
|---|---|---|---|---|---|
| Start | 11:00 AM | 70 | 7.7 | 19.9 | 0.2 |
| Finish | 3:30 PM | 70 | 9.3 | 21.1 | 1.3 |

**TABLE 3**

## FEED AND DISCHARGE - ASSAYS AND TONNAGES

| Date | Sample No. | Feed Assay KCl | Feed Assay WI | D/C Assay KCl | D/C Assay WI | Feed tph | D/C tph | "Loss" tph | D/C % +100 m |
|---|---|---|---|---|---|---|---|---|---|
| Sept 12 | 1 | 35.7 | 4.3 | | | | | | |
| | 3 | 37.3 | 3.9 | | | | | | |
| | 5 | 36.7 | 4.3 | | | | | | |
| Average | | 36.6 | 4.2 | | | 5 | | | |
| Sept 14 | 2 | 34.4 | 5.0 | | | | | | |
| | 4 | 36.7 | 4.9 | | | | | | |
| | 7 | 36.7 | 4.6 | | | | | | |
| Average | | 35.9 | 4.8 | | | 5 | | | |
| Sept 15 | 1 | 38.0 | 4.5 | | | | | | |
| | 3 | 36.0 | 4.8 | | | | | | |
| Average | | 37.0 | 4.7 | | | 5 | | | |
| Sept 16 | 1 | 39.3 | 4.0 | 37.0 | 3.0 | | | | |
| | 2 | 37.8 | 5.4 | 36.2 | 3.3 | | | | |
| | 3 | 36.6 | 5.3 | 34.9 | 2.8 | | | | |
| | 4 | 37.7 | 4.5 | 35.2 | 4.0 | | | | |
| | 5 | 36.4 | 5.6 | 33.0 | 2.8 | | | | |
| Average | | 37.6 | 5.0 | 35.3 | 3.2 | 5 | | | |
| Sept 19 | 1 | 38.8 | 3.4 | 35.7 | 3.8 | 4.1 | 4.0 | | 95 |
| | 2 | 34.9 | 3.6. | 31.9 | 3.9 | 3.4 | 3.9 | | 93 |
| | 3 | 38.3 | 3.8 | 37.8 | 2.4 | 4.3 | 3.2 | | 94 |
| | 4 | 38.4 | 3.8 | 33.0 | 3.0 | 3.8 | 3.0 | | 90 |
| | 5 | 37.9 | 4.8 | 31.6 | 2.7 | 3.5 | 3.2 | | 91 |
| | 6 | 36.8 | 4.4 | 33.2 | 3.7 | | 2.7 | | 91 |
| | 7 | 38.5 | 3.8 | 33.7 | 3.5 | 3.5 | 1.9 | | 95 |
| | 8 | 37.3 | 4.7 | 34.1 | 3.3 | | 2.0 | | 95 |
| | 9 | 36.9 | 5.3 | 34.9 | 3.7 | 2.5 | 1.9 | | 95 |
| | 10 | 36.9 | 3.9 | 34.2 | 3.6 | 2.5 | 2.0 | | 93 |
| Average | | 37.5 | 4.2 | 34.0 | 3.4 | 3.4 | 2.8 | 0.6 | 93 |
| Sept 21 | 1 | 36.1 | 4.6 | 34.5 | 3.8 | | | | |
| | 2 | 38.8 | 4.1 | 35.8 | 3.3 | | | | |
| | 3 | 39.8 | 4.3 | | | | | | |
| | 4 | 40.2 | 4.1 | 36.3 | 3.2 | | | | |
| | 5 | 40.1 | 4.3 | | | | | | |
| | 6 | 40.8 | 4.2 | 37.0 | 3.4 | | | | |
| | 7 | 40.4 | 3.3 | 31.9 | 2.9 | | | | |
| Average | | 39.5 | 4.1 | 35.1 | 3.3 | 6.9 | 6.3 | 0.6 | 93 |
| Sept 22 | 1 | 40.2 | 4.3 | | | | | | |
| | 2 | 40.9 | 4.6 | | | | | | |
| | 3 | 42.0 | 3.4 | | | | | | |
| Average | | 41.0 | 4.1 | | | 6.7 | 5.9 | 0.8 | |
| Sept 24 | 1 | 38.9 | 3.0 | 37.6 | 2.7 | | | | |
| | 2 | 39.4 | 3.3 | 33.5 | 2.6 | | | | |
| | 3 | 42.5 | 3.7 | 40.4 | 2.2 | | | | |
| | 4 | 38.7 | 3.4 | 39.8 | 2.9 | | | | |
| Average | | 39.9 | 3.4 | 37.8 | 2.6 | 7.2 | 6.4 | 0.8 | 96 |
| Sept 29 | 1 | 38.1 | 3.7 | 33.8 | 3.3 | | | | |
| | 4 | 40.4 | 3.6 | 37.7 | 2.9 | | | | |
| | 7 | 38.9 | 3.2 | 34.3 | 2.6 | | | | |
| | 8 | 36.5 | 4.2 | 34.7 | 3.4 | | | | |
| Average | | 38.5 | 3.6 | 35.1 | 3.1 | 3.0 | 2.2 | 0.8 | 95 |

**TABLE 4**

## FEED SCREEN ANALYSIS

Laboratory Tests To Estimate Feed Breakdown

Retained daily composites of feed to the Tri-Flo were used for all tests. The size analysis of the feed was determined and 500 gram samples were added to plant brine to give a 60% solids slurry. The slurry was agitated at 500 rpm on the laboratory mixer for 30 seconds and wet screened at 48 mesh and 200 mesh. All solids fractions were filtered and dried, then assayed for KCl and WI.

FEED SCREEN ANALYSIS (COMPOSITE DATA)

| | Standard Tyler Mesh | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | + 6 | 8 | 10 | 14 | 20 | 28 | 35 | 48 | -48 |
| Sept 12-16 | 3.2 | 25.0 | 25.3 | 25.6 | 13.4 | 4.0 | 1.3 | 0.8 | 1.4 |
| Sept 19 | 3.2 | 27.5 | 26.8 | 24.7 | 13.0 | 2.7 | 0.8 | 0.4 | 0.9 |
| Sept 21 | 2.8 | 23.1 | 20.8 | 19.0 | 14.6 | 12.0 | 3.0 | 1.7 | 3.0 |
| Sept 22 | 2.0 | 21.2 | 20.5 | 19.0 | 15.8 | 11.4 | 3.6 | 2.0 | 4.5 |
| Sept 29 | 3.5 | 23.2 | 22.1 | 20.2 | 16.7 | 12.5 | 1.2 | 0.2 | 0.4 |

# TABLE 5

## FEED BREAKDOWN DATA

### FEED BREAKDOWN (IN MIXING WITH BRINE)

| Date | Product | Weight % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Sept 12-16 | +48 | 93.4 | 37.0 | 1.4 | 34.6 | 1.3 | 95.8 | 34.2 |
| | -48/+200 | 1.2 | 41.8 | 3.3 | 0.5 | 0.0 | 1.4 | 0.0 |
| | -200 | 5.4 | 19.2 | 46.3 | 1.0 | 2.5 | 2.8 | 65.8 |
| Total | | 100.0 | | | 36.1 | 3.8 | 100.0 | 100.0 |
| Sept 19 | +48 | 92.5 | 36.1 | 1.6 | 33.4 | 1.5 | 94.8 | 36.6 |
| | -48/+200 | 2.4 | 37.6 | 3.6 | 0.9 | 0.1 | 2.6 | 2.4 |
| | -200 | 5.1 | 18.2 | 49.0 | 0.9 | 2.5 | 2.6 | 61.0 |
| Total | | 100.0 | | | 35.2 | 4.1 | 100.0 | 100.0 |
| Sept 21 | +48 | 92.6 | 38.7 | 1.6 | 35.8 | 1.5 | 94.5 | 37.5 |
| | -48/+200 | 2.4 | 45.1 | 3.3 | 1.1 | 0.1 | 2.9 | 2.5 |
| | -200 | 5.0 | 20.7 | 47.7 | 1.0 | 2.4 | 2.6 | 60.0 |
| Total | | 100.0 | | | 37.9 | 4.0 | 100.0 | 100.0 |
| Sept 22 | +48 | 91.2 | 39.6 | 1.3 | 36.1 | 1.2 | 92.3 | 31.6 |
| | -48/+200 | 3.3 | 47.3 | 1.7 | 1.6 | 0.1 | 4.1 | 2.6 |
| | -200 | 5.5 | 25.0 | 44.3 | 1.4 | 2.5 | 3.6 | 65.8 |
| Total | | 100.0 | | | 39.1 | 3.8 | 100.0 | 100.0 |
| Sept 29 | +48 | 95.2 | 39.0 | 1.6 | 37.1 | 1.5 | 97.6 | 41.7 |
| | -48/+200 | 0.4 | 36.9 | 5.9 | 0.1 | 0.0 | 0.3 | 0.0 |
| | -200 | 4.4 | 18.2 | 48.6 | 0.8 | 2.1 | 2.1 | 58.3 |
| Total | | 100.0 | | | 38.0 | 3.6 | 100.0 | 100.0 |

# APPENDIX IV

## SWECO FEED PREPARATION SCREEN PERFORMANCE DATA


Table 1 Summary of Sweco Screen Operating Statistics

Table 2 Screen Analysis of Sweco Feed and Product Streams

**TABLE 1**

**SUMMARY OF SWECO SCREEN OPERATING STATISTICS**

| Feed tph | % -28 m | Performance at 28 m Recovery % | Performance at 28 m Efficiency % | Lower Screening Deck Mesh | Lower Screening Deck % Open Area | Lower Screening Deck Cleaning Kit | Comments |
|---|---|---|---|---|---|---|---|
| 20 | 5 | - | - | 24 | 44 | No | Design |
| 13 | 16 | 98.5 | 67.5 | 24 | 44 | No | Initial operation |
| 13 | 3 | 73.4 | 96.0 | 18 | 70 | Yes | New screen, lower deck |
| 13 | 9 | 93.9 | 85.7 | 26 | 67 | Yes | New screen on lower deck |
| 6 | 2 | - | - | 26 | 67 | Yes | Feed rate reduced |

During initial operation, the lower screen deck appeared to be overloaded and partly blinded. Brushing the screen and making several adjustments to the screen to vary the throw and flow pattern did not reduce the quantity of fines reporting to the product.

The blinding problem was overcome by installing a cleaning kit for the lower screen. The capacity problem was overcome by installing a fine wire cloth with a larger open area.

The 18 mesh cloth was damaged on September 19th and all tests after this date were done on the 26 mesh screen cloth.

Feed rate to the screen was controlled by an orifice plate and never exceeded 13 tons per hour, as this proved to be a more than adequate feed rate for the Triflo plant.

Screen performance details are given in Table 2.

**TABLE 2**

# Sweco Screen Performance

1.

| | Screen Analysis - % | | | | Tons Per Hour | | | |
|---|---|---|---|---|---|---|---|---|
| Mesh | Feed | O/S | Prod | U/S | Feed | O/S | Prod | U/S |
| + 6 | 19.7 | 93.8 | 3.5 | | 2.6 | 2.3 | 0.3 | |
| 8 | 11.8 | 4.7 | 17.6 | | 1.6 | 0.1 | 1.4 | |
| 10 | 11.0 | 0.4 | 17.4 | | 1.4 | | 1.4 | |
| 14 | 10.3 | 0.3 | 17.0 | | 1.3 | | 1.3 | |
| 20 | 8.2 | 0.8 | 13.8 | | 1.1 | | 1.1 | |
| 28 | 8.6 | | 14.6 | 0.8 | 1.1 | | 1.2 | |
| 35 | 6.1 | | 6.4 | 10.7 | 0.8 | | 0.5 | 0.3 |
| 48 | 6.1 | | 3.3 | 19.3 | 0.8 | | 0.3 | 0.5 |
| - 48 | 18.2 | | 6.4 | 69.2 | 2.4 | | 0.5 | 1.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 13.1 | 2.4 | 8.0 | 2.7 |

Operating Conditions:
(a) Top deck: 5 mesh
(b) Bottom deck: 24 mesh and 44% open area, no cleaning deck
Recovery of -6/+28 mesh material = 6.4/6.5 x 100 = 98.5%
Screening efficiency at 28 mesh = 2.7/4.0 x 100 = 67.5%

2.

| | Screen Analysis - % | | | | Tons Per Hour | | | |
|---|---|---|---|---|---|---|---|---|
| Mesh | Feed | O/S | Prod | U/S | Feed | O/S | Prod | U/S |
| + 5 | 14.1 | 81.9 | | | 1.8 | 1.6 | | |
| 6 | 4.7 | 14.0 | 5.5 | | 0.6 | 0.3 | 0.3 | |
| 8 | 10.4 | 3.4 | 28.0 | | 1.4 | 0.1 | 1.4 | |
| 10 | 10.2 | 0.2 | 27.0 | | 1.3 | | 1.3 | |
| 14 | 10.0 | 0.5 | 25.3 | | 1.3 | | 1.2 | |
| 20 | 8.3 | | 11.4 | 8.5 | 1.1 | | 0.6 | 0.5 |
| 28 | 9.0 | | 1.7 | 18.8 | 1.2 | | 0.1 | 1.1 |
| 35 | 6.6 | | 0.4 | 14.0 | 0.9 | | | 0.9 |
| 48 | 7.2 | | 0.2 | 14.6 | 0.9 | | | 0.9 |
| - 48 | 19.5 | | 0.5 | 44.1 | 2.5 | | 0.1 | 2.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 13.0 | 2.0 | 5.0 | 6.0 |

Operating Conditions:
(a) Top deck: 5 mesh
(b) Bottom deck: 18 mesh and 70% open area, cleaning deck installed
Recovery of -6/+28 mesh material = 4.7/6.4 x 100 = 73.4%
Screening efficiency at 28 mesh = 2.4/2.5 x 100 = 96.0%

3.

| | Screen Analysis - % | | | | Tons Per Hour | | | |
|---|---|---|---|---|---|---|---|---|
| Mesh | Feed | O/S | Prod | U/S | Feed | O/S | Prod | U/S |
| + 5 | 12.2 | 79.0 | | | 1.6 | 1.6 | | |
| 6 | 5.1 | 17.8 | 2.1 | | 0.7 | 0.4 | 0.2 | |
| 8 | 11.2 | 2.7 | 20.7 | | 1.5 | 0.1 | 1.4 | |
| 10 | 11.0 | 0.5 | 20.3 | | 1.5 | | 1.4 | |
| 14 | 10.1 | | 19.5 | | 1.3 | | 1.4 | |
| 20 | 8.7 | | 15.5 | | 1.0 | | 1.1 | |
| 28 | 8.3 | | 12.8 | 7.1 | 1.0 | | 0.9 | 0.3 |
| 35 | 6.6 | | 3.2 | 15.5 | 0.9 | | 0.2 | 0.6 |
| - 35 | 26.8 | | 5.9 | 77.4 | 3.5 | | 0.4 | 3.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 13.0 | 2.1 | 7.0 | 3.9 |

Operating Conditions:
(a) Top deck: 5 mesh
(b) Bottom deck: 26 mesh and 67% open area, cleaning deck installed
Recovery of -6/+28 mesh material = 6.2/6.6 x 100 = 93.9%
Screening efficiency at 28 mesh = 3.6/4.2 x 100 = 85.7%

# APPENDIX V

## FRACTIONAL ANALYSIS

Fractional Analysis of the following Tri-Flo Sample Runs


Table 1 September 19th, Sample 2

Table 2 September 19th, Sample 10

Table 3 September 29th, Sample 4

Table 4 September 29th, Sample 5

Table 5 September 29th, Sample 7

Figure 1 September 19th, Sample 2 -- Graphical Presentation

Figure 2 September 19th, Sample 10 -- Graphical Presentation

**TABLE 1**

## Fractional Analysis - Tri-Flo Separator

### September 19, 1987, Sample 2

| Stream | Mesh | Screen % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Feed | + 6 | 2.7 | 19.5 | 15.3 | 0.5 | 0.4 | 1.4 | 10.3 |
| | 8 | 25.0 | 31.9 | 5.2 | 8.0 | 1.3 | 22.4 | 33.3 |
| | 10 | 25.1 | 34.0 | 3.3 | 8.5 | 0.8 | 23.8 | 20.5 |
| | 14 | 25.3 | 37.8 | 3.1 | 9.6 | 0.8 | 26.9 | 20.5 |
| | 20 | 13.7 | 42.0 | 2.5 | 5.8 | 0.3 | 16.2 | 7.7 |
| | 28 | 3.9 | 40.9 | 2.8 | 1.6 | 0.1 | 4.5 | 2.6 |
| | - 28 | 4.3 | 39.1 | 3.9 | 1.7 | 0.2 | 4.8 | 5.1 |
| | Total | 100.0 | | | 35.7 | 3.9 | 100.0 | 100.0 |
| Discharge | + 6 | 1.3 | 13.2 | 4.0 | 0.2 | 0.1 | 0.6 | 2.9 |
| | 8 | 26.6 | 25.3 | 3.8 | 6.7 | 1.0 | 20.9 | 29.4 |
| | 10 | 26.0 | 30.9 | 3.1 | 8.0 | 0.8 | 25.0 | 23.5 |
| | 14 | 23.6 | 34.9 | 2.9 | 8.2 | 0.7 | 25.6 | 20.6 |
| | 20 | 15.3 | 39.8 | 2.4 | 6.1 | 0.4 | 19.0 | 11.8 |
| | 28 | 4.9 | 41.5 | 3.2 | 2.0 | 0.2 | 6.3 | 5.9 |
| | - 28 | 2.3 | 37.6 | 7.3 | 0.8 | 0.2 | 2.6 | 5.9 |
| | Total | 100.0 | | | 32.0 | 3.4 | 100.0 | 100.0 |
| Concentrate | + 6 | 1.2 | 96.9 | 0.5 | 1.2 | 0.0 | 1.2 | 0.0 |
| | 8 | 20.1 | 96.2 | 0.4 | 19.3 | 0.1 | 20.1 | 20.0 |
| | 10 | 25.1 | 96.7 | 0.7 | 24.3 | 0.2 | 25.3 | 40.0 |
| | 14 | 26.8 | 97.0 | 0.4 | 26.0 | 0.1 | 27.1 | 20.0 |
| | 20 | 18.5 | 96.4 | 0.4 | 17.8 | 0.1 | 18.5 | 20.0 |
| | 28 | 5.5 | 94.4 | 0.5 | 5.2 | 0.0 | 5.4 | 0.0 |
| | - 28 | 2.8 | 81.0 | 0.6 | 2.3 | 0.0 | 2.4 | 0.0 |
| | Total | 100.0 | | | 96.1 | 0.5 | 100.0 | 100.0 |
| Middlings | + 6 | 2.4 | 24.0 | 2.9 | 0.6 | 0.1 | 3.3 | 4.3 |
| | 8 | 20.8 | 29.0 | 2.8 | 6.0 | 0.6 | 33.0 | 26.2 |
| | 10 | 23.3 | 20.8 | 2.1 | 4.8 | 0.5 | 26.4 | 21.7 |
| | 14 | 25.4 | 14.0 | 2.2 | 3.6 | 0.6 | 19.8 | 26.2 |
| | 20 | 18.6 | 12.0 | 1.8 | 2.2 | 0.3 | 12.1 | 13.0 |
| | 28 | 6.4 | 11.4 | 2.0 | 0.7 | 0.1 | 3.8 | 4.3 |
| | - 28 | 3.1 | 9.5 | 4.8 | 0.3 | 0.1 | 1.6 | 4.3 |
| | Total | 100.0 | | | 18.2 | 2.3 | 100.0 | 100.0 |
| Tails | + 6 | 2.7 | 6.7 | 5.8 | 0.2 | 0.2 | 3.2 | 3.9 |
| | 8 | 30.8 | 7.7 | 5.9 | 2.4 | 1.8 | 38.1 | 35.2 |
| | 10 | 26.5 | 6.1 | 4.1 | 1.6 | 1.1 | 25.3 | 21.6 |
| | 14 | 22.9 | 5.0 | 3.7 | 1.1 | 0.8 | 17.5 | 15.7 |
| | 20 | 12.6 | 4.9 | 4.6 | 0.6 | 0.6 | 9.5 | 11.8 |
| | 28 | 2.9 | 6.7 | 9.1 | 0.2 | 0.3 | 3.2 | 5.9 |
| | - 28 | 1.6 | 13.0 | 18.6 | 0.2 | 0.3 | 3.2 | 5.9 |
| | Total | 100.0 | | | 6.3 | 5.1 | 100.0 | 100.0 |

TABLE 2

## Fractional Analysis - Tri-Flo Separator

### September 19, 1987, Sample 10

| Stream | Mesh | Screen % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Feed | + 6 | 2.0 | 25.7 | 11.7 | 0.5 | 0.2 | 1.4 | 4.5 |
| | 8 | 24.0 | 32.4 | 6.3 | 7.8 | 1.5 | 21.2 | 34.1 |
| | 10 | 28.4 | 35.5 | 5.3 | 10.1 | 1.5 | 27.4 | 34.1 |
| | 14 | 27.7 | 38.7 | 2.9 | 10.7 | 0.8 | 29.1 | 18.2 |
| | 20 | 14.4 | 43.1 | 2.8 | 6.2 | 0.4 | 16.8 | 9.1 |
| | 28 | 2.3 | 43.8 | 2.1 | 1.0 | 0.0 | 2.7 | 0.0 |
| | - 28 | 1.2 | 42.9 | 2.7 | 0.5 | 0.0 | 1.4 | 0.0 |
| | Total | 100.0 | | | 36.8 | 4.4 | 100.0 | 100.0 |
| Discharge | + 6 | 0.8 | 20.2 | 5.0 | 0.2 | 0.0 | 0.6 | 0.0 |
| | 8 | 19.8 | 31.6 | 4.0 | 6.3 | 0.8 | 18.3 | 25.0 |
| | 10 | 28.0 | 31.7 | 3.3 | 8.9 | 0.9 | 25.8 | 28.0 |
| | 14 | 25.8 | 33.8 | 2.7 | 8.7 | 0.7 | 25.3 | 21.9 |
| | 20 | 18.0 | 39.5 | 2.0 | 7.1 | 0.4 | 20.5 | 12.5 |
| | 28 | 5.9 | 44.6 | 2.6 | 2.6 | 0.2 | 7.5 | 6.3 |
| | - 28 | 1.7 | 41.0 | 10.0 | 0.7 | 0.2 | 2.0 | 6.3 |
| | Total | 100.0 | | | 34.5 | 3.2 | 100.0 | 100.0 |
| Concentrate | + 6 | 1.0 | 91.1 | 0.4 | 0.9 | 0.0 | 1.0 | 0.0 |
| | 8 | 18.8 | 93.0 | 0.6 | 17.5 | 0.1 | 18.6 | 25.0 |
| | 10 | 25.3 | 94.6 | 0.5 | 23.9 | 0.1 | 25.4 | 25.0 |
| | 14 | 27.9 | 95.3 | 0.5 | 26.6 | 0.1 | 28.2 | 25.0 |
| | 20 | 20.6 | 94.9 | 0.5 | 19.5 | 0.1 | 20.6 | 25.0 |
| | 28 | 5.2 | 93.0 | 0.4 | 4.8 | 0.0 | 5.1 | 0.0 |
| | - 28 | 1.2 | 82.7 | 0.8 | 1.0 | 0.0 | 1.1 | 0.0 |
| | Total | 100.0 | | | 94.2 | 0.4 | 100.0 | 100.0 |
| Middlings | + 6 | 1.1 | 22.0 | 2.6 | 0.2 | 0.0 | 1.2 | 0.0 |
| | 8 | 19.8 | 22.4 | 1.7 | 4.4 | 0.3 | 26.3 | 18.8 |
| | 10 | 24.6 | 19.6 | 1.5 | 4.8 | 0.4 | 28.7 | 25.0 |
| | 14 | 27.2 | 13.8 | 1.4 | 3.8 | 0.4 | 22.8 | 25.0 |
| | 20 | 20.3 | 11.6 | 1.8 | 2.4 | 0.4 | 14.4 | 25.0 |
| | 28 | 5.6 | 15.7 | 1.3 | 0.9 | 0.1 | 5.4 | 6.2 |
| | - 28 | 1.4 | 15.5 | 3.3 | 0.2 | 0.0 | 1.2 | 0.0 |
| | Total | 100.0 | | | 16.7 | 1.6 | 100.0 | 100.0 |
| Tails | + 6 | 1.5 | 6.4 | 14.3 | 0.1 | 0.2 | 2.5 | 3.0 |
| | 8 | 27.8 | 5.0 | 8.2 | 1.4 | 2.3 | 35.0 | 34.3 |
| | 10 | 28.8 | 3.8 | 6.0 | 1.1 | 1.7 | 27.5 | 25.3 |
| | 14 | 24.8 | 3.2 | 5.7 | 0.8 | 1.4 | 20.0 | 21.0 |
| | 20 | 13.5 | 3.1 | 4.9 | 0.4 | 0.7 | 10.0 | 10.4 |
| | 28 | 2.5 | 5.6 | 9.0 | 0.1 | 0.2 | 2.5 | 3.0 |
| | - 28 | 1.1 | 13.6 | 19.2 | 0.1 | 0.2 | 2.5 | 3.0 |
| | Total | 100.0 | | | 4.0 | 6.7 | 100.0 | 100.0 |

**TABLE 3**

## Fractional Analysis - Tri-Flo Separator

### September 29, 1987, Sample 4

| Stream | Mesh | Screen % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Feed | + 6 | 2.8 | 29.6 | 12.5 | 0.8 | 0.4 | 2.0 | 12.2 |
| | 8 | 22.8 | 36.2 | 4.5 | 8.3 | 1.0 | 20.6 | 30.3 |
| | 10 | 22.0 | 38.9 | 2.9 | 8.6 | 0.6 | 21.3 | 18.2 |
| | 14 | 20.7 | 40.3 | 2.6 | 8.3 | 0.5 | 20.6 | 15.2 |
| | 20 | 16.8 | 44.1 | 2.2 | 7.5 | 0.4 | 18.6 | 12.1 |
| | 28 | 13.1 | 45.6 | 2.1 | 6.0 | 0.3 | 14.9 | 9.0 |
| | - 28 | 1.8 | 43.6 | 2.6 | 0.8 | 0.1 | 2.0 | 3.0 |
| | Total | 100.0 | | | 40.3 | 3.3 | 100.0 | 100.0 |
| Discharge | + 6 | 1.8 | 22.2 | 8.5 | 0.4 | 0.2 | 1.3 | 7.1 |
| | 8 | 22.8 | 33.9 | 3.6 | 7.7 | 0.8 | 20.5 | 28.6 |
| | 10 | 22.4 | 34.5 | 2.9 | 7.7 | 0.6 | 20.5 | 21.4 |
| | 14 | 20.9 | 39.2 | 2.3 | 8.2 | 0.5 | 21.7 | 17.9 |
| | 20 | 14.8 | 41.2 | 2.5 | 6.1 | 0.4 | 16.2 | 14.3 |
| | 28 | 12.1 | 43.9 | 1.9 | 5.3 | 0.2 | 14.0 | 7.1 |
| | - 28 | 5.2 | 42.2 | 2.1 | 2.2 | 0.1 | 5.8 | 3.6 |
| | Total | 100.0 | | | 37.6 | 2.8 | 100.0 | 100.0 |
| Concentrate | + 6 | 0.8 | 95.6 | 0.3 | 0.8 | 0.0 | 0.8 | 0.0 |
| | 8 | 14.7 | 95.6 | 0.4 | 14.1 | 0.1 | 14.7 | 20.0 |
| | 10 | 20.9 | 96.5 | 0.5 | 20.2 | 0.1 | 21.1 | 20.0 |
| | 14 | 22.9 | 96.6 | 0.3 | 21.6 | 0.1 | 22.6 | 20.0 |
| | 20 | 19.4 | 96.7 | 0.3 | 18.8 | 0.1 | 19.6 | 20.0 |
| | 28 | 17.0 | 95.9 | 0.4 | 16.3 | 0.1 | 17.0 | 20.0 |
| | - 28 | 4.6 | 88.0 | 0.5 | 4.0 | 0.0 | 4.2 | 0.0 |
| | Total | 100.0 | | | 95.8 | 0.5 | 100.0 | 100.0 |
| Middlings | + 6 | 1.1 | 36.4 | 2.5 | 0.4 | 0.0 | 1.5 | 0.0 |
| | 8 | 16.1 | 40.2 | 2.0 | 6.5 | 0.3 | 21.8 | 17.6 |
| | 10 | 18.7 | 39.1 | 1.8 | 7.3 | 0.3 | 24.3 | 17.6 |
| | 14 | 20.2 | 33.1 | 1.8 | 6.7 | 0.4 | 22.4 | 23.5 |
| | 20 | 18.2 | 25.0 | 1.5 | 4.6 | 0.3 | 15.3 | 17.6 |
| | 28 | 19.3 | 17.4 | 1.4 | 3.4 | 0.3 | 11.2 | 17.6 |
| | - 28 | 6.4 | 16.5 | 1.7 | 1.1 | 0.1 | 3.5 | 6.1 |
| | Total | 100.0 | | | 30.0 | 1.7 | 100.0 | 100.0 |
| Tails | + 6 | 2.2 | 7.6 | 7.6 | 0.2 | 0.2 | 3.1 | 4.3 |
| | 8 | 27.3 | 8.0 | 5.8 | 2.2 | 1.6 | 34.3 | 34.8 |
| | 10 | 25.0 | 6.7 | 5.1 | 1.7 | 1.3 | 26.6 | 28.3 |
| | 14 | 20.5 | 5.3 | 3.6 | 1.1 | 0.7 | 17.2 | 15.2 |
| | 20 | 13.8 | 4.7 | 3.1 | 0.6 | 0.4 | 9.4 | 8.7 |
| | 28 | 8.8 | 4.6 | 3.4 | 0.4 | 0.3 | 6.3 | 6.5 |
| | - 28 | 2.4 | 9.5 | 5.5 | 0.2 | 0.1 | 3.1 | 2.2 |
| | Total | 100.0 | | | 6.4 | 4.6 | 100.0 | 100.0 |

TABLE 4

## Fractional Analysis - Tri-Flo Separator

### September 29, 1987, Sample 5

| Stream | Mesh | Screen % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Feed | + 6 | | | | | | | |
| | 8 | | | | | | | |
| | 10 | | | | | | | |
| | 14 | | | | | | | |
| | 20 | | | | | | | |
| | 28 | | | | | | | |
| | - 28 | | | | | | | |
| | Total | | | | | | | |
| Discharge | + 6 | | | | | | | |
| | 8 | | | | | | | |
| | 10 | | | | | | | |
| | 14 | | | | | | | |
| | 20 | | | | | | | |
| | 28 | | | | | | | |
| | - 28 | | | | | | | |
| | Total | | | | | | | |
| Concentrate | + 6 | 1.0 | 91.2 | 0.6 | 0.9 | 0.0 | 1.0 | 0.0 |
| | 8 | 17.2 | 92.6 | 0.5 | 15.9 | 0.1 | 17.2 | 20.0 |
| | 10 | 20.5 | 94.1 | 0.5 | 19.3 | 0.1 | 20.9 | 20.0 |
| | 14 | 21.8 | 94.3 | 0.4 | 20.6 | 0.1 | 22.3 | 20.0 |
| | 20 | 18.8 | 93.3 | 0.4 | 17.5 | 0.1 | 18.8 | 20.0 |
| | 28 | 16.5 | 90.4 | 0.7 | 15.0 | 0.1 | 16.1 | 20.0 |
| | - 28 | 4.2 | 81.4 | 0.8 | 3.4 | 0.0 | 3.7 | 0.0 |
| | Total | 100.0 | | | 92.6 | 0.5 | 100.0 | 100.0 |
| Middlings | + 6 | 1.1 | 18.0 | 2.4 | 0.2 | 0.0 | 1.5 | 0.0 |
| | 8 | 15.7 | 21.1 | 2.3 | 3.3 | 0.4 | 24.8 | 22.2 |
| | 10 | 17.5 | 18.3 | 2.1 | 3.2 | 0.4 | 24.1 | 22.2 |
| | 14 | 19.1 | 13.5 | 1.6 | 2.6 | 0.3 | 19.5 | 16.7 |
| | 20 | 18.5 | 9.8 | 1.7 | 1.8 | 0.3 | 13.5 | 16.7 |
| | 28 | 20.9 | 7.4 | 1.6 | 1.5 | 0.3 | 11.3 | 16.7 |
| | - 28 | 7.2 | 9.4 | 2.0 | 0.7 | 0.1 | 5.3 | 5.5 |
| | Total | 100.0 | | | 13.3 | 1.8 | 100.0 | 100.0 |
| Tails | + 6 | 1.7 | 6.4 | 11.0 | 0.1 | 0.2 | 1.9 | 4.3 |
| | 8 | 26.2 | 6.7 | 6.2 | 1.8 | 1.6 | 34.0 | 34.0 |
| | 10 | 25.7 | 5.4 | 4.1 | 1.4 | 1.1 | 26.3 | 23.4 |
| | 14 | 20.8 | 4.5 | 3.7 | 0.9 | 0.8 | 17.0 | 17.0 |
| | 20 | 13.9 | 4.1 | 3.7 | 0.6 | 0.5 | 11.3 | 10.6 |
| | 28 | 9.1 | 3.8 | 3.7 | 0.3 | 0.3 | 5.7 | 6.4 |
| | - 28 | 2.5 | 8.5 | 7.1 | 0.2 | 0.2 | 3.8 | 4.3 |
| | Total | 100.0 | | | 5.3 | 4.7 | 100.0 | 100.0 |

**TABLE 5**

## Fractional Analysis - Tri-Flo Separator

### September 29, 1987, Sample 7

| Stream | Mesh | Screen % | Assay KCl | Assay WI | Factor KCl | Factor WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|---|---|
| Feed | + 6 | 2.8 | 28.1 | 12.8 | 0.8 | 0.4 | 2.0 | 12.1 |
| | 8 | 19.2 | 34.5 | 4.4 | 6.6 | 0.8 | 17.0 | 24.2 |
| | 10 | 21.0 | 37.6 | 3.0 | 7.9 | 0.6 | 20.4 | 18.2 |
| | 14 | 21.6 | 39.9 | 2.7 | 8.6 | 0.6 | 22.3 | 18.2 |
| | 20 | 18.6 | 41.4 | 2.7 | 7.7 | 0.5 | 19.8 | 15.2 |
| | 28 | 14.7 | 43.2 | 2.1 | 6.3 | 0.3 | 16.2 | 9.1 |
| | - 28 | 2.1 | 43.9 | 2.4 | 0.9 | 0.1 | 2.3 | 3.0 |
| | Total | 100.0 | | | 38.8 | 3.3 | 100.0 | 100.0 |
| Discharge | + 6 | 1.6 | 20.4 | 5.3 | 0.3 | 0.1 | 0.8 | 4.3 |
| | 8 | 21.5 | 26.6 | 2.5 | 5.7 | 0.5 | 16.9 | 21.6 |
| | 10 | 22.7 | 33.4 | 2.6 | 7.6 | 0.6 | 22.3 | 26.6 |
| | 14 | 21.9 | 36.0 | 2.3 | 7.9 | 0.5 | 23.2 | 21.6 |
| | 20 | 14.5 | 37.9 | 1.9 | 5.5 | 0.3 | 16.1 | 13.0 |
| | 28 | 12.1 | 40.8 | 1.6 | 4.9 | 0.2 | 14.4 | 8.6 |
| | - 28 | 5.7 | 37.0 | 2.6 | 2.1 | 0.1 | 6.3 | 4.3 |
| | Total | 100.0 | | | 34.0 | 2.3 | 100.0 | 100.0 |
| Concentrate | + 6 | 0.6 | 96.5 | 0.4 | 0.6 | 0.0 | 0.6 | 0.0 |
| | 8 | 12.3 | 96.5 | 0.4 | 11.9 | 0.0 | 12.3 | 0.0 |
| | 10 | 18.8 | 96.8 | 0.4 | 18.2 | 0.1 | 18.9 | 25.0 |
| | 14 | 22.3 | 97.4 | 0.3 | 21.7 | 0.1 | 22.5 | 25.0 |
| | 20 | 20.9 | 96.9 | 0.3 | 20.3 | 0.1 | 21.0 | 25.0 |
| | 28 | 19.4 | 96.1 | 0.3 | 18.6 | 0.1 | 19.3 | 25.0 |
| | - 28 | 5.7 | 90.5 | 0.4 | 5.2 | 0.0 | 5.4 | 0.0 |
| | Total | 100.0 | | | 96.5 | 0.4 | 100.0 | 100.0 |
| Middlings | + 6 | 0.6 | 44.7 | 1.7 | 0.3 | 0.0 | 0.7 | 0.0 |
| | 8 | 11.5 | 57.1 | 1.7 | 6.6 | 0.2 | 15.7 | 13.3 |
| | 10 | 16.6 | 55.5 | 1.5 | 9.2 | 0.2 | 22.0 | 13.3 |
| | 14 | 20.6 | 49.8 | 1.3 | 10.3 | 0.3 | 24.6 | 20.0 |
| | 20 | 20.0 | 37.9 | 1.5 | 7.6 | 0.3 | 18.0 | 20.0 |
| | 28 | 22.0 | 27.0 | 1.6 | 5.9 | 0.4 | 14.3 | 26.7 |
| | - 28 | 8.7 | 22.2 | 1.7 | 1.9 | 0.1 | 4.7 | 6.7 |
| | Total | 100.0 | | | 41.8 | 1.5 | 100.0 | 100.0 |
| Tails | + 6 | 2.2 | 11.4 | 10.8 | 0.3 | 0.2 | 2.8 | 4.4 |
| | 8 | 23.8 | 12.5 | 6.0 | 3.0 | 1.4 | 28.0 | 31.2 |
| | 10 | 24.8 | 11.1 | 3.7 | 2.7 | 0.9 | 25.3 | 20.0 |
| | 14 | 21.8 | 9.7 | 3.7 | 2.1 | 0.8 | 19.6 | 17.8 |
| | 20 | 14.9 | 9.2 | 3.8 | 1.4 | 0.6 | 13.1 | 13.3 |
| | 28 | 9.9 | 9.1 | 3.9 | 0.9 | 0.4 | 8.4 | 8.9 |
| | - 28 | 2.6 | 12.4 | 6.5 | 0.3 | 0.2 | 2.8 | 4.4 |
| | Total | 100.0 | | | 10.7 | 4.5 | 100.0 | 100.0 |

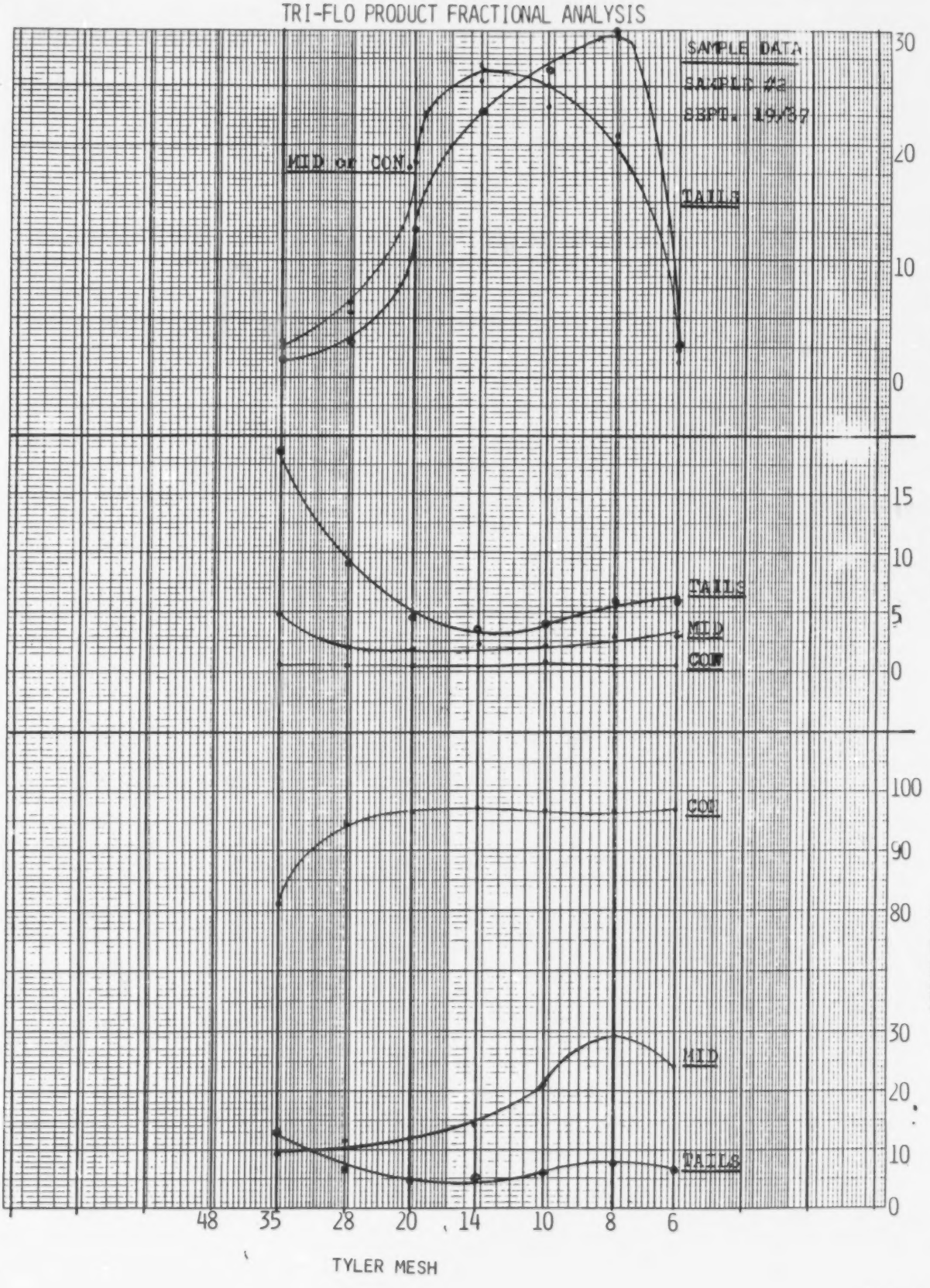

TRI-FLO PRODUCT FRACTIONAL ANALYSIS
SAMPLE DATA
SAMPLE #2
SEPT. 19,57
MID or CON.
TAILS
WEIGHT PERCENT
30
20
10
0
TAILS
MID
CON
PERCENT WI
15
10
5
0
CON
MID
TAILS
PERCENT KCL
100
90
80
30
20
10
0
48
35
28
20
14
10
8
6
TYLER MESH

FIG. 1

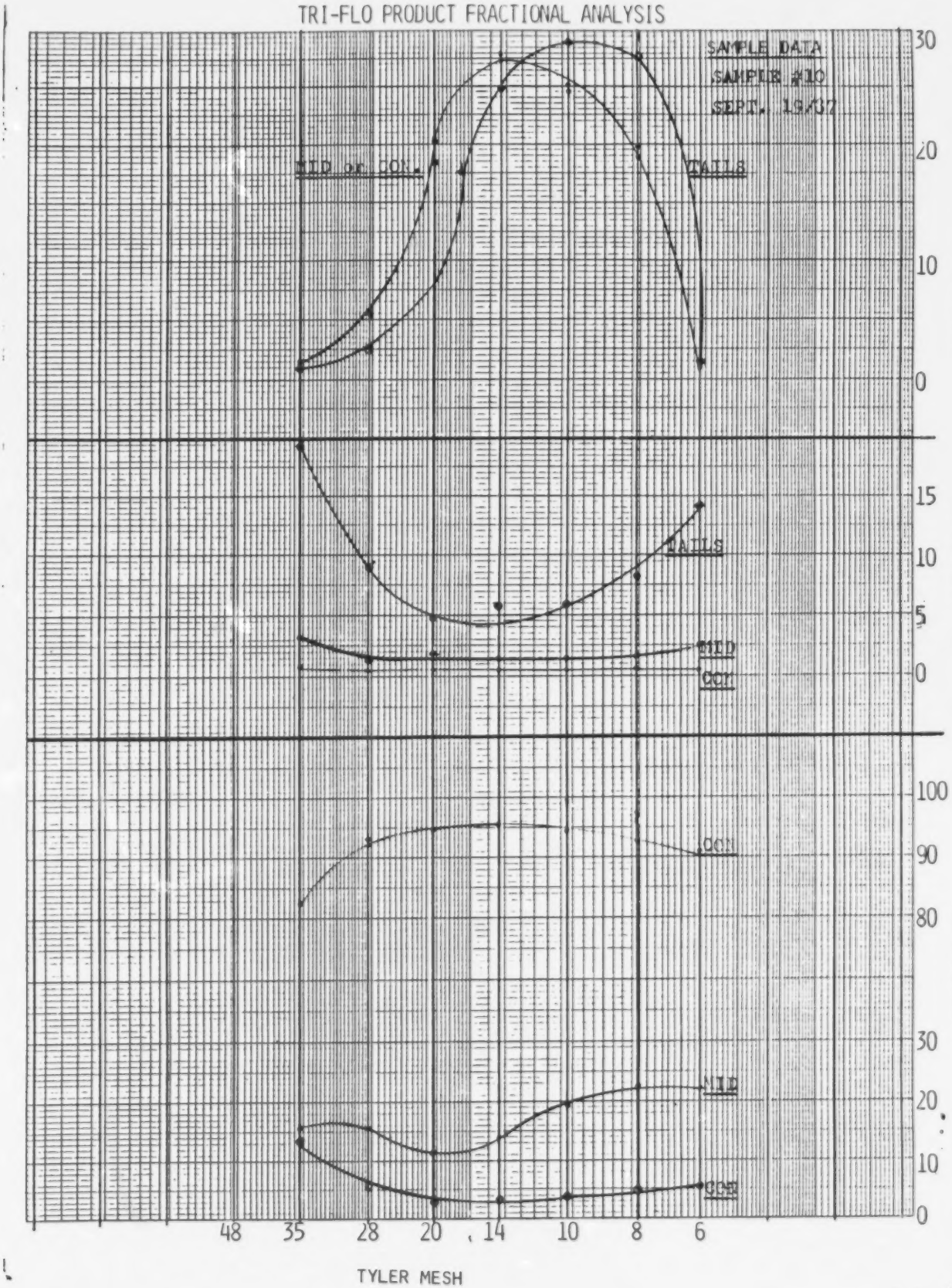

TRI-FLO PRODUCT FRACTIONAL ANALYSIS
SAMPLE DATA
SAMPLE #10
SEPT. 19/57
MID or COL.
TAILS
TAILS
MID
COL
COL
MID
COAL
30
20
10
0
15
10
5
0
100
90
80
30
20
10
0
WEIGHT PERCENT
PERCENT WI
PERCENT KCL
48
35
28
20
14
10
8
6
TYLER MESH

FIG. 2

# APPENDIX VI

## HEAVY LIQUID SEPARATION

Heavy liquid separation of feed, concentrate, middling and tails on selected Tri-flo sample runs.


| | |
|---|---|
| Table 1 | Material balance - sample #4, September 29, 1987 |
| Table 2 | Heavy liquid separation data - sample #4, September 29, 1987 |
| Table 3 | Calculation of partition numbers - sample #4, September 29, 1987 |
| Table 4 | Material balance - sample #1, September 16, 1987 |
| Table 5 | Heavy liquid separation data - sample #1, September 16, 1987 |
| Table 6 | Calculation of partition numbers - sample #1, September 16, 1987 |

| | |
|---|---|
| Figure 1 | Tromp distribution curves - sample #4, September 29, 1987 |
| Figure 2 | Tromp distribution curves - sample #1, September 16, 1987 |
| Figure 3 | Distribution to concentrate as a function of grade |
| Figure 4 | Variation of KCl grade with liquid specific gravity |

**TABLE 1**

## MATERIAL BALANCE

### Sample #4, September 19, 1987

| | | Analysis | | Factor | | Distribution | |
|---|---|---|---|---|---|---|---|
| | Wt. % | KCl | WI | KCl | WI | KCl | WI |
| Concentrate | 29.8 | 95.8 | 0.3 | 28.5 | 0.1 | 76.4 | 3.3 |
| Middlings | 18.9 | 30.4 | 2.0 | 5.7 | 0.4 | 15.3 | 13.3 |
| Tails | 51.3 | 6.1 | 4.8 | 3.1 | 2.5 | 8.3 | 83.4 |
| Head | 100.0 | | | 37.3 | 3.0 | 100.0 | 100.0 |

F1 2.09 Sp. Gr. (Marcy)
F2 2.03 Sp. Gr. (Marcy)

**TABLE 2**

## Heavy Liquid Separation

### Sample #4, September 19, 1987

| Stream | Sp. Gr. Fraction | Weight % | Assay KCl | Assay WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|
| Feed | + 2.25 | 6.8 | 14.8 | 27.6 | 2.5 | 67.9 |
| | 2.20 - 2.25 | 2.9 | 8.6 | 11.9 | 0.5 | 10.7 |
| | 2.175 - 2.20 | 3.6 | 4.5 | 6.0 | 0.5 | 7.1 |
| | 2.15 - 2.175 | 32.4 | 1.2 | 0.5 | 1.0 | 7.1 |
| | 2.10 - 2.15 | 15.0 | 10.0 | 1.0 | 3.8 | 3.6 |
| | 2.075 - 2.10 | 1.7 | 46.9 | 1.9 | 2.0 | 0.0 |
| | 2.05 - 2.075 | 1.6 | 66.5 | 2.0 | 2.8 | 0.0 |
| | 2.00 - 2.05 | 9.3 | 91.0 | 1.4 | 21.5 | 3.6 |
| | 1.99 - 2.00 | 5.8 | 97.4 | 0.3 | 14.2 | 0.0 |
| | 1.983 - 1.99 | 20.7 | 98.2 | 0.2 | 50.8 | 0.0 |
| | - 1.983 | 0.2 | 98.9 | 0.2 | 0.5 | 0.0 |
| Concentrate | + 2.075 | 1.7 | 12.7 | 2.7 | 0.2 | 0.0 |
| | 2.05 - 2.075 | 0.6 | 63.7 | 3.5 | 0.4 | 0.0 |
| | 2.00 - 2.05 | 11.6 | 88.5 | 2.3 | 10.7 | 75.0 |
| | 1.99 - 2.00 | 16.1 | 97.4 | 0.4 | 16.4 | 25.0 |
| | 1.983 - 1.99 | 68.1 | 98.9 | 0.0 | 70.3 | 0.0 |
| | 1.983 | 1.9 | 98.9 | 0.0 | 2.0 | 0.0 |
| Middlings | + 2.25 | 1.4 | 13.0 | 27.4 | 0.6 | 22.2 |
| | 2.20 - 2.25 | 1.5 | 7.7 | 13.1 | 0.3 | 11.1 |
| | 2.175 - 2.20 | 1.8 | 5.7 | 6.8 | 0.3 | 5.6 |
| | 2.15 - 2.175 | 35.3 | 1.2 | 0.8 | 1.2 | 16.7 |
| | 2.10 - 2.15 | 22.2 | 9.8 | 1.4 | 6.5 | 16.7 |
| | 2.075 - 2.10 | 3.5 | 41.8 | 3.6 | 4.4 | 5.6 |
| | 2.05 - 2.075 | 5.3 | 54.2 | 2.4 | 8.6 | 5.6 |
| | 2.00 - 2.05 | 12.5 | 80.9 | 2.4 | 29.8 | 16.7 |
| | 1.99 - 2.00 | 6.4 | 97.8 | 0.2 | 18.6 | 0.0 |
| | 1.983 - 1.99 | 10.2 | 99.0 | 0.0 | 29.8 | 0.0 |
| Tails | + 2.25 | 8.2 | 15.3 | 32.1 | 19.4 | 59.1 |
| | 2.20 - 2.25 | 4.6 | 6.6 | 14.6 | 4.5 | 15.9 |
| | 2.175 - 2.20 | 5.9 | 4.7 | 8.7 | 4.5 | 11.4 |
| | 2.15 - 2.175 | 60.4 | 1.5 | 0.7 | 13.4 | 9.1 |
| | 2.10 - 2.15 | 17.9 | 10.5 | 1.2 | 28.4 | 4.5 |
| | 2.075 - 2.10 | 1.1 | 43.1 | 2.4 | 7.5 | 0.0 |
| | 2.05 - 2.075 | 0.8 | 63.1 | 3.9 | 7.5 | 0.0 |
| | 2.00 - 2.05 | 1.1 | 89.0 | 2.6 | 14.9 | 0.0 |

FIRST STAGE (Calculation of Partition Number)

| Sp. Gr. Fraction | Cumulative Wt. % Sink Cc | Float Tc | Feed Fc | Calculation (Fc-Tc) (1) | (Cc-Tc) (2) | (1):(2) | % of Total Sink (3) | Float (4) | Wt. % Feed Actual | Calc. (3)+(4)=(5) | Partition No. (3):(5) | Nominal Sp. Gr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| + 2.25 | 8.2 | 0.6 | 6.8 | 6.2 | 7.6 | 81.6 | 4.3 | 0.3 | 6.8 | 4.6 | 93.5 | + 2.25 |
| 2.20 - 2.25 | 12.8 | 1.2 | 9.7 | 8.5 | 11.6 | 73.3 | 2.4 | 0.3 | 2.9 | 2.7 | 88.9 | 2.225 |
| 2.175 - 2.20 | 18.7 | 1.9 | 13.3 | 11.4 | 16.8 | 67.9 | 3.1 | 0.3 | 3.6 | 3.4 | 91.2 | 2.188 |
| 2.15 - 2.175 | 79.1 | 15.6 | 45.7 | 30.1 | 63.5 | 47.4 | 32.0 | 6.5 | 32.4 | 38.5 | 83.1 | 2.163 |
| 2.10 - 2.15 | 97.0 | 24.2 | 60.7 | 36.5 | 72.8 | 50.1 | 9.5 | 4.1 | 15.0 | 13.6 | 69.9 | 2.125 |
| 2.075 - 2.10 | 98.1 | 26.6 | 62.4 | 35.8 | 71.5 | 50.0 | 0.6 | 1.1 | 1.7 | 1.7 | 35.3 | 2.088 |
| 2.05 - 2.075 | 98.9 | 29.0 | 64.0 | 35.0 | 69.9 | 50.0 | 0.4 | 1.1 | 1.6 | 1.5 | 26.6 | 2.063 |
| 2.00 - 2.05 | 100.0 | 40.9 | 73.3 | 32.4 | 59.1 | 54.8 | 0.6 | 5.6 | 9.3 | 6.2 | 9.7 | 2.025 |
| 1.99 - 2.00 | 100.0 | 53.2 | 79.1 | 25.9 | 46.8 | 55.3 | | 5.8 | 5.8 | 5.8 | 0.0 | 1.995 |
| 1.983 - 1.99 | 100.0 | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | | 22.0 | 20.9 | 22.0 | 0.0 | 1.987 |
| | | | | 221.8 | 419.6 | 52.9 | 52.9 | 47.1 | 100.0 | 100.0 | | |

SECOND STAGE (Calculation of Partition Number)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| + 2.25 | 1.4 | | 0.6 | 0.6 | 1.4 | 42.9 | 0.5 | | 0.6 | 0.5 | 100.0 | 2.25 |
| 2.20 - 2.25 | 2.9 | | 1.2 | 1.2 | 2.9 | 41.4 | 0.6 | | 0.6 | 0.6 | 100.0 | 2.225 |
| 2.175 - 2.20 | 4.7 | | 1.9 | 1.9 | 4.7 | 38.3 | 0.7 | | 0.7 | 0.7 | 100.0 | 2.188 |
| 2.15 - 2.175 | 40.0 | | 15.6 | 15.6 | 40.0 | 38.8 | 13.7 | | 13.7 | 13.7 | 100.0 | 2.163 |
| 2.10 - 2.15 | 62.2 | | 24.2 | 24.2 | 62.2 | 38.7 | 8.6 | | 8.6 | 8.6 | 100.0 | 2.125 |
| 2.075 - 2.10 | 65.7 | 1.7 | 26.6 | 24.9 | 64.0 | 38.9 | 1.4 | 1.0 | 2.4 | 2.4 | 58.3 | 2.088 |
| 2.05 - 2.075 | 71.0 | 2.3 | 29.0 | 26.7 | 68.7 | 39.0 | 2.1 | 0.4 | 2.4 | 2.5 | 84.0 | 2.063 |
| 2.00 - 2.05 | 83.5 | 13.9 | 40.9 | 27.0 | 69.6 | 39.2 | 4.8 | 7.1 | 11.9 | 11.9 | 40.3 | 2.025 |
| 1.99 - 2.00 | 89.9 | 30.0 | 53.2 | 23.2 | 59.9 | 38.7 | 2.5 | 9.8 | 12.3 | 12.3 | 20.3 | 1.995 |
| 1.983 - 1.99 | 100.0 | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | 4.0 | 42.8 | 46.8 | 46.8 | 8.5 | 1.987 |
| | | | | 145.3 | 373.4 | 38.9 | 38.9 | 61.1 | 100.0 | 100.0 | | |

TABLE 3

TABLE 4

## Material Balance

### Sample #1, September 16, 1987

| | | Analysis | | Factor | | Distribution | |
|---|---|---|---|---|---|---|---|
| | Wt. % | KCl | WI | KCl | WI | KCl | WI |
| Concentrate | 18.0 | 96.9 | 0.3 | 17.4 | 0.0 | 51.2 | 0.0 |
| Middlings | 22.0 | 59.5 | 1.6 | 13.1 | 0.4 | 38.5 | 13.3 |
| Tails | 60.0 | 5.8 | 4.4 | 3.5 | 2.6 | 10.3 | 86.7 |
| Head | 100.0 | | | 34.0 | 3.0 | 100.0 | 100.0 |

| | |
|---|---|
| F1 | 2.06 Sp. Gr. (Marcy) |
| F2 | 1.93 Sp. Gr. (Marcy) |
| S1 | 2.22 Sp. Gr. (Marcy) |
| S2 | 2.11 Sp. Gr. (Marcy) |
| F | 1.62 Sp. Gr. (Marcy) |

**TABLE 5**

## Heavy Liquid Separation

### Sample #1, September 16, 1987

| Stream | Sp. Gr. Fraction | Weight % | Assay KCl | Assay WI | Distribution KCl | Distribution WI |
|---|---|---|---|---|---|---|
| Feed | + 2.25 | 6.4 | 16.7 | 29.9 | 2.8 | 68.7 |
| | 2.20 - 2.25 | 2.6 | 7.7 | 12.1 | 0.5 | 10.9 |
| | 2.175 - 2.20 | 3.2 | 3.8 | 5.6 | 0.3 | 6.0 |
| | 2.15 - 2.175 | 35.2 | 1.0 | 0.5 | 0.9 | 6.0 |
| | 2.10 - 2.15 | 13.2 | 8.4 | 0.7 | 2.9 | 3.2 |
| | 2.075 - 2.10 | 1.8 | 42.4 | 1.9 | 1.9 | 0.1 |
| | 2.051 - 2.075 | 1.6 | 57.8 | 1.9 | 2.5 | 0.1 |
| | 2.01 - 2.051 | 6.3 | 85.1 | 1.6 | 13.8 | 3.6 |
| | 1.99 - 2.01 | 5.9 | 97.7 | 0.4 | 14.8 | 0.7 |
| | 1.982 - 1.99 | 22.2 | 98.3 | 0.1 | 55.5 | 0.7 |
| | - 1.982 | 1.6 | 97.9 | 0.2 | 4.1 | 0.0 |
| Concentrate | + 2.05 | 1.7 | 14.2 | 2.2 | 0.2 | 7.6 |
| | 2.01 - 2.05 | 4.7 | 88.0 | 2.5 | 4.2 | 41.7 |
| | 1.99 - 2.01 | 7.4 | 96.5 | 0.7 | 7.3 | 41.7 |
| | 1.982 - 1.99 | 77.2 | 99.1 | 0.0 | 79.1 | 0.0 |
| | - 1.982 | 9.0 | 99.2 | 0.0 | 9.2 | 0.0 |
| Middlings | + 2.175 | 4.2 | 7.5 | 18.1 | 0.5 | 53.3 |
| | 2.15 - 2.175 | 20.4 | 1.3 | 0.8 | 0.5 | 13.3 |
| | 2.10 - 2.15 | 13.3 | 6.3 | 0.5 | 1.4 | 6.7 |
| | 2.075 - 2.10 | 2.2 | 42.0 | 2.9 | 1.5 | 6.7 |
| | 2.05 - 2.075 | 2.4 | 57.4 | 2.9 | 2.4 | 6.7 |
| | 2.01 - 2.05 | 13.7 | 84.1 | 1.7 | 19.8 | 13.3 |
| | 1.99 - 2.01 | 4.3 | 96.8 | 0.5 | 7.2 | 0.0 |
| | 1.982 - 1.99 | 30.6 | 98.3 | 0.1 | 51.7 | 0.0 |
| | - 1.982 | 8.8 | 99.1 | 0.0 | 14.9 | 0.0 |
| Tails | + 2.25 | 6.8 | 14.1 | 28.7 | 15.6 | 57.1 |
| | 2.20 - 2.25 | 3.8 | 6.5 | 15.2 | 3.1 | 17.1 |
| | 2.175 - 2.20 | 5.8 | 3.6 | 5.3 | 3.1 | 8.6 |
| | 2.15 - 2.175 | 54.0 | 1.2 | 0.7 | 9.4 | 11.4 |
| | 2.10 - 2.15 | 25.0 | 6.3 | 0.5 | 25.0 | 2.9 |
| | 2.075 - 2.10 | 1.9 | 38.7 | 2.7 | 10.9 | 2.9 |
| | 2.051 - 2.075 | 1.0 | 56.9 | 2.4 | 9.4 | 0.0 |
| | 2.01 - 2.051 | 1.2 | 86.0 | 2.4 | 15.6 | 0.0 |
| | - 2.01 | 0.5 | 97.5 | 0.3 | 7.8 | 0.0 |

FIRST STAGE (Calculation of Partition Number)

| Sp. Gr. Fraction | Cumulative Wt. % Sink Cc | Cumulative Wt. % Float Tc | Cumulative Wt. % Feed Fc | Calculation (Fc-Tc) (1) | Calculation (Cc-Tc) (2) | Calculation (1):(2) | % of Total Sink (3) | % of Total Float (4) | Wt. % Feed Actual | Wt. % Feed Calc. (3)+(4)=(5) | Partition No. (3):(5) | Nominal Sp. Gr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| + 2.25 | 6.8 | | 6.4 | 6.4 | 6.8 | 94.1 | 4.1 | | 6.4 | 4.1 | 100.0 | |
| 2.25 - 2.20 | 10.6 | | 9.0 | 9.0 | 10.6 | 84.9 | 2.3 | | 2.6 | 2.3 | 100.0 | 2.225 |
| 2.20 - 2.175 | 16.4 | 2.3 | 12.2 | 9.9 | 14.1 | 70.2 | 3.5 | 0.9 | 3.2 | 4.4 | 79.5 | 2.188 |
| 2.175 - 2.15 | 70.4 | 13.3 | 47.4 | 44.0 | 57.1 | 77.1 | 32.3 | 4.5 | 35.2 | 36.8 | 92.6 | 2.163 |
| 2.15 - 2.10 | 95.4 | 20.5 | 60.6 | 40.1 | 74.9 | 53.5 | 15.1 | 2.9 | 13.2 | 18.0 | 84.4 | 2.13 |
| 2.10 - 2.075 | 97.3 | 21.7 | 62.4 | 40.7 | 75.6 | 53.8 | 1.1 | 0.5 | 1.8 | 1.6 | 68.8 | 2.088 |
| 2.075 - 2.051 | 98.3 | 23.8 | 64.0 | 40.2 | 74.5 | 54.0 | 0.6 | 0.8 | 1.6 | 1.4 | 42.9 | 2.063 |
| 2.051 - 2.01 | 99.5 | 33.4 | 70.3 | 36.9 | 66.1 | 55.8 | 0.7 | 3.8 | 6.3 | 4.5 | 15.6 | 2.031 |
| 2.01 - 1.99 | 100.0 | 39.1 | 76.2 | 37.1 | 60.9 | 60.9 | 0.3 | 2.3 | 5.9 | 2.6 | 11.5 | 2.00 |
| 1.99 - 1.982 | | 91.1 | 93.4 | | | | | 20.8 | 22.2 | 20.8 | 0.0 | 1.986 |
| - 1.982 | | 100.0 | 100.0 | 0.0 | | | | 3.5 | 1.6 | 3.5 | 0.0 | |
| | | | | 264.3 | 440.6 | 60.0 | 60.0 | 40.0 | 100.0 | 100.0 | | |

SECOND STAGE (Calculation of Partition Number)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| + 2.175 | 4.2 | | 2.3 | 2.3 | 4.2 | 54.8 | 2.3 | | 2.3 | 2.3 | 100.0 | |
| 2.175 - 2.15 | 24.6 | | 13.3 | 13.3 | 24.6 | 54.1 | 11.1 | | 11.0 | 11.1 | 100.0 | 2.163 |
| 2.15 - 2.10 | 37.9 | | 20.5 | 20.5 | 37.9 | 54.1 | 7.2 | | 7.2 | 7.2 | 100.0 | 2.13 |
| 2.10 - 2.075 | 40.1 | | 21.7 | 21.7 | 40.1 | 54.1 | 1.2 | | 1.2 | 1.2 | 100.0 | 2.088 |
| 2.075 - 2.051 | 42.5 | 1.7 | 23.8 | 22.1 | 40.8 | 54.2 | 1.3 | 0.8 | 2.1 | 2.1 | 61.9 | 2.063 |
| 2.051 - 2.01 | 56.2 | 6.4 | 33.4 | 27.4 | 49.8 | 55.0 | 7.4 | 2.1 | 9.6 | 9.5 | 77.9 | 2.031 |
| 2.01 - 1.99 | 60.5 | 13.8 | 39.1 | 25.3 | 46.7 | 54.2 | 2.3 | 3.4 | 5.7 | 5.7 | 40.4 | 2.00 |
| 1.99 - 1.982 | 91.1 | 91.0 | 91.1 | 0.0 | 0.0 | 0.0 | 16.6 | 35.3 | 52.0 | 51.9 | 32.0 | 1.986 |
| - 1.982 | 100.0 | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | 4.8 | 4.1 | 9.0 | 8.9 | 53.9 | |
| | | | | 132.6 | 244.1 | 54.3 | 54.3 | 45.7 | 100.0 | 100.0 | | |

TABLE 6

TROMP DISTRIBUTION CURVES (Sample #4 Sept. 29/87)

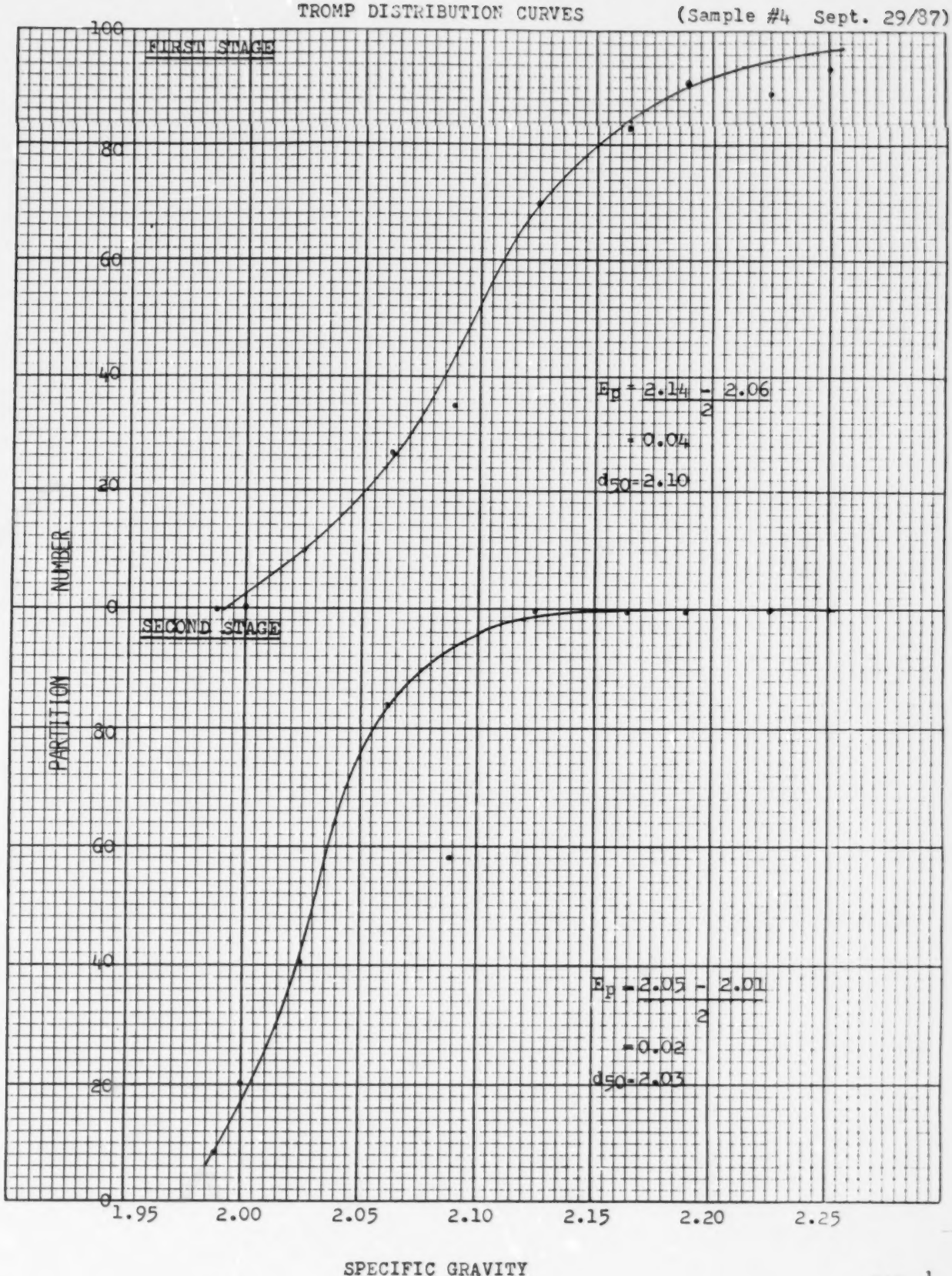



FIG. 1

TROMP DISTRIBUTION CURVES (Sample #1 Sept. 16/37)

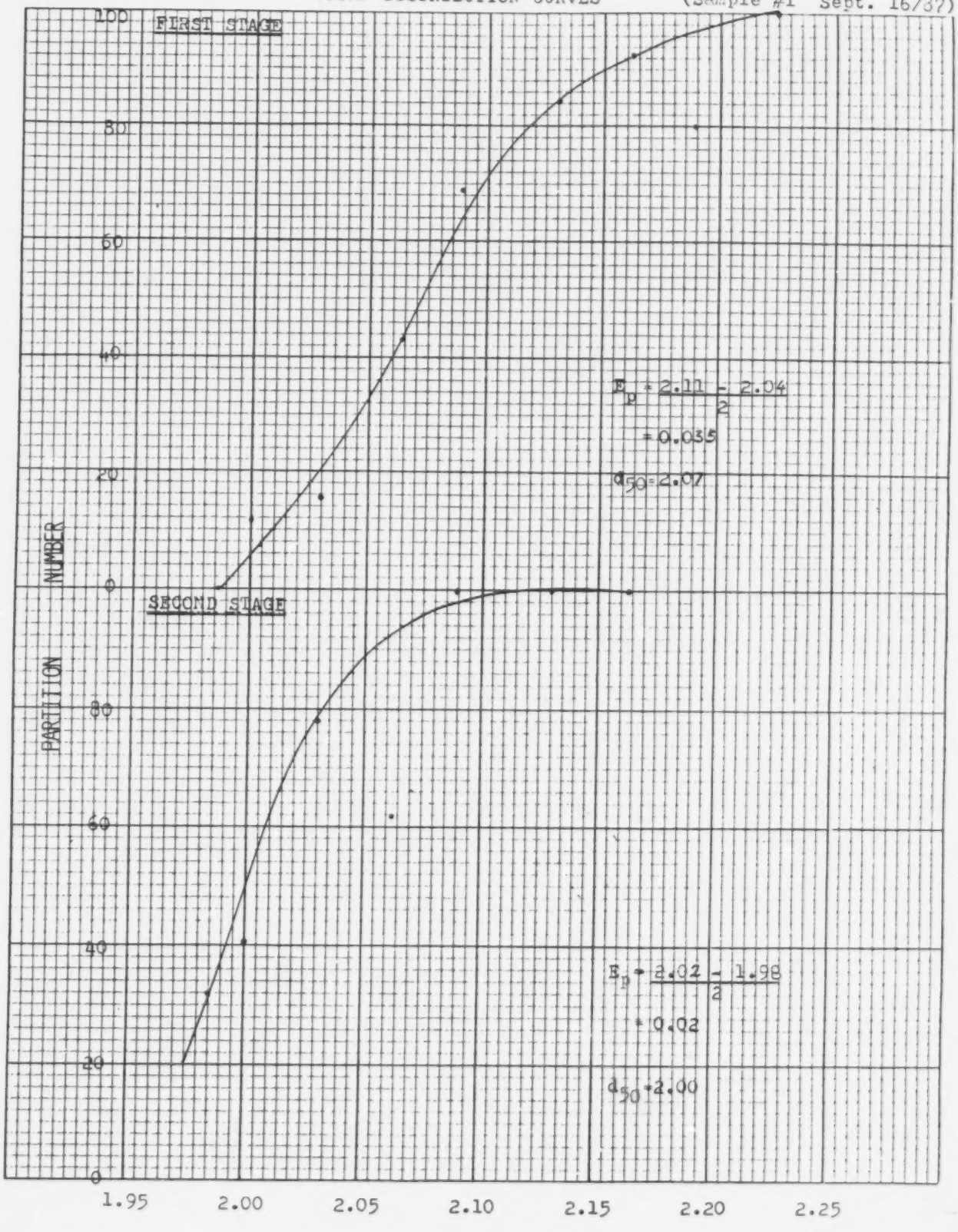



FIG. 7

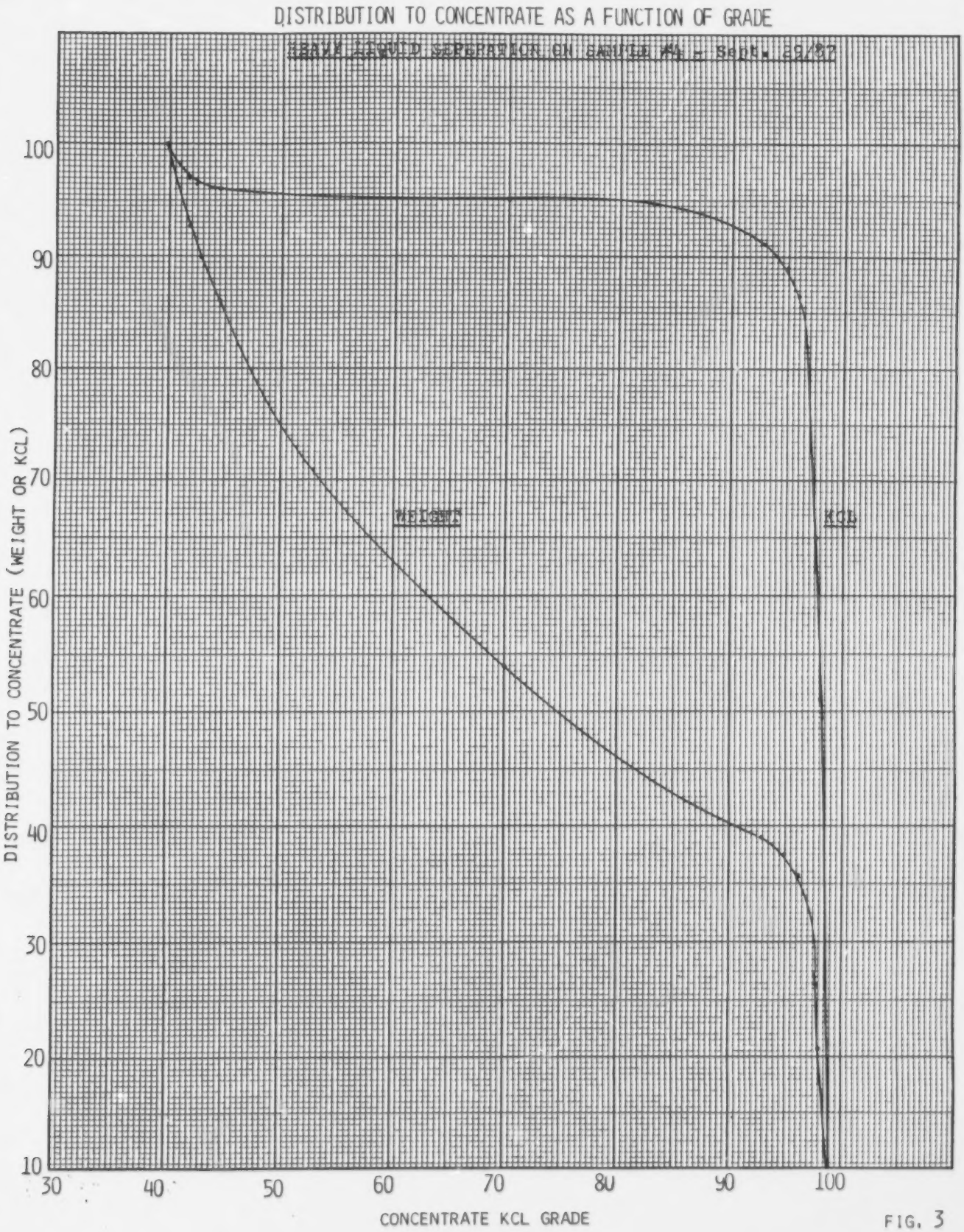

DISTRIBUTION TO CONCENTRATE AS A FUNCTION OF GRADE
HEAVY LIQUID SEPERATOR ON SAMPLE #4 - Sept. 29/82
DISTRIBUTION TO CONCENTRATE (WEIGHT OR KCL)
100
90
80
70
60
50
40
30
20
10
WEIGHT
KCL
30
40
50
60
70
80
90
100
CONCENTRATE KCL GRADE

FIG. 3

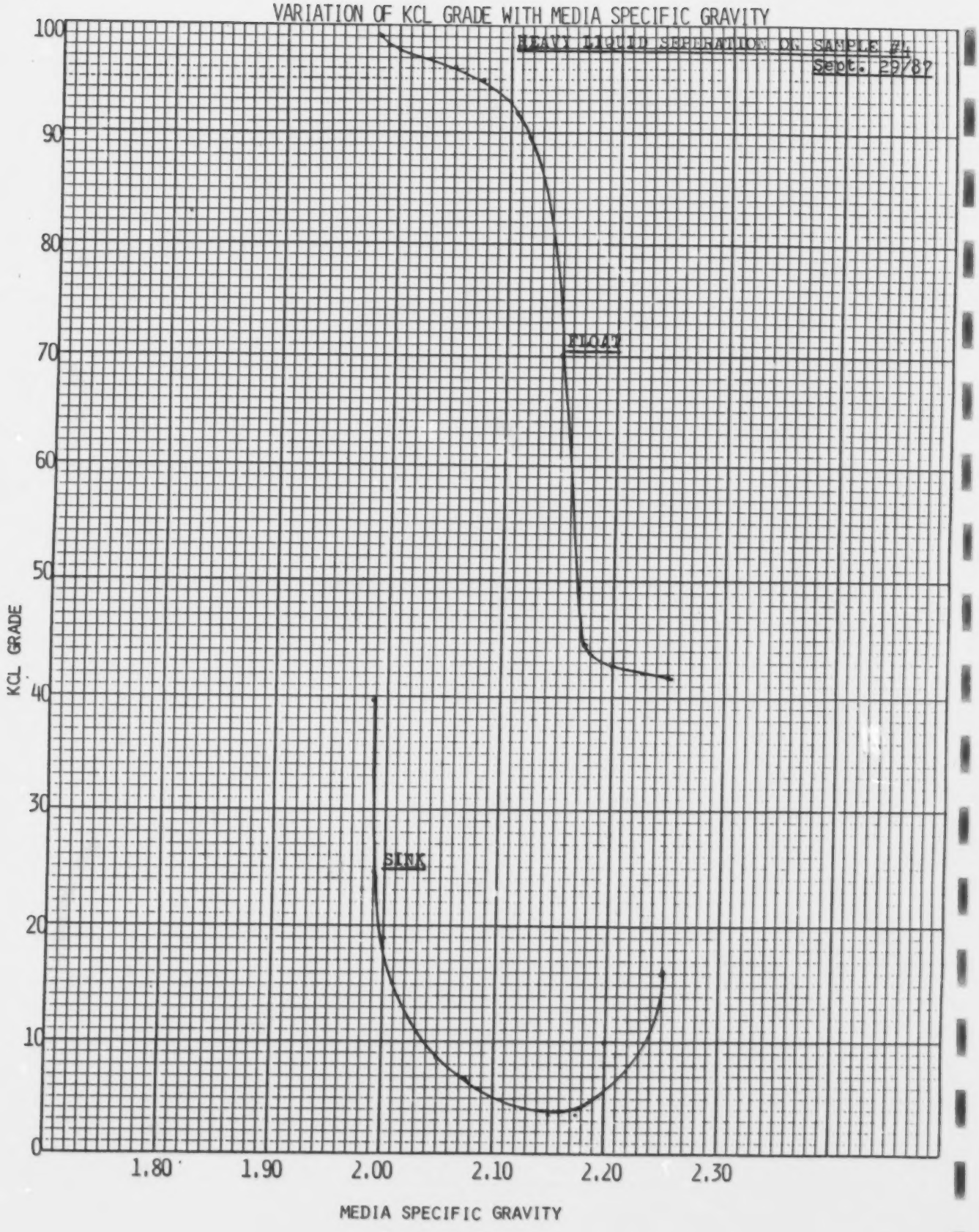

VARIATION OF KCL GRADE WITH MEDIA SPECIFIC GRAVITY
HEAVY LIQUID SEPERATION OF SAMPLE #4
Sept. 29/82
FLOAT
SINK
KCL GRADE
100
90
80
70
60
50
40
30
20
10
0
1.80
1.90
2.00
2.10
2.20
2.30
MEDIA SPECIFIC GRAVITY

FIG. 4

# APPENDIX VII

## Pilot Plant Installation and Operation

Figure 1 Pilot Plant Flow Sheet

## Pilot Plant Installation and Operation

### A. Plant Installation

The Tri-flo separator was too tall to install inside the Mill and was therefore setup on a temporary base to the west of the Crushing Plant.

A 60" diameter Sweco Screen was installed inside the Crushing Plant to provide the Tri-flo with 6 x 28 mesh feed. A 4" gravity line was used to convey the feed to the Tri-flo.

The discharge of the Tri-flo was fed by gravity to a sump in the scrubbing area for disposal to the primary scrubber.

### B. Pilot Plant Operation - (See figure 1)

The separation circuit consists of the Tri-flo, back pressure controls, high density and low density pumps and media density controls.

The media recovery circuit consists of a four position Deister vibrating screen, cyclone and cyclone feed pump, magnetic separator and demag coil, dilute media pump, magnetic separator effluent pumps and a sump pump.

The Deister screen was partitioned longitudinally into three sections for the three Tri-flo products. The third and fourth sections of the screen were used for product washing. The wash liquid was pumped to the magnetic separator for media recovery. The screen cloth used was 40 x 40 mesh for sections 1 and 4 and 50 x 50 mesh for sections 2 and 3.

Some of the magnetic separator effluent was recycled to prewash the product, final washing was achieved with two sets of brine sprays. Plant brine was initially used for this purpose but was found to be unsuitable as cooling of the brine resulted in rapid blinding of screen cloth with crystallized solids. This problem was overcome by using reclaim brine which is undersaturated in KCl and NaCl.

The media is cleaned of entrained ore by passing the cyclone overflow through the magnetic separator. Most of the magnetic separator effluent is then discarded.

For the separating section to operate under stable conditions the cyclone and magnetic separator must supply an excess of thickened media to the high density and low density pump boxes, so that the density controls can function by adding dilution brine to the media feed pump intakes.

In practice this condition is achieved by splitting the following streams between the high and low density pump boxes:

1. Cyclone overlow recycle.

2. Cyclone underflow.

3. Magnetic separator thickened material.

4. Media recovered on middle section of screen.

5. Diversion of high density media pump discharge to low density pump box.

6. Diversion of low density media pump discharge to high density pump box.

High and low density pump box levels were maintained by addition of fresh media to the high density pump box. This increases the rate of dilution through the density control system and increases the volume in the system.

The back pressure controls on the Tri-flo were not used as product was discharged into these vessels with considerable force and increasing the static pressure at this location would have had negligible effect.

The dilute media pump box was controlled by the amount of fresh wash brine used and by the rate of discard of magnetic separator effluent.

The four pumps handling the media were equipped with water sealed glands, 2 gpm of water was used on each, controlled by a dole valve.

Total brine usage for density control and wash sprays was 60 gpm (U.S.).

Media usage was 100 lbs. magnetite grade B and 30 lbs. Ferro Silicon per hour of operation at a feed rate of 6 tph of feed.

# TRI-FLO SEPERATOR PILOT PLANT FLOW SHEET

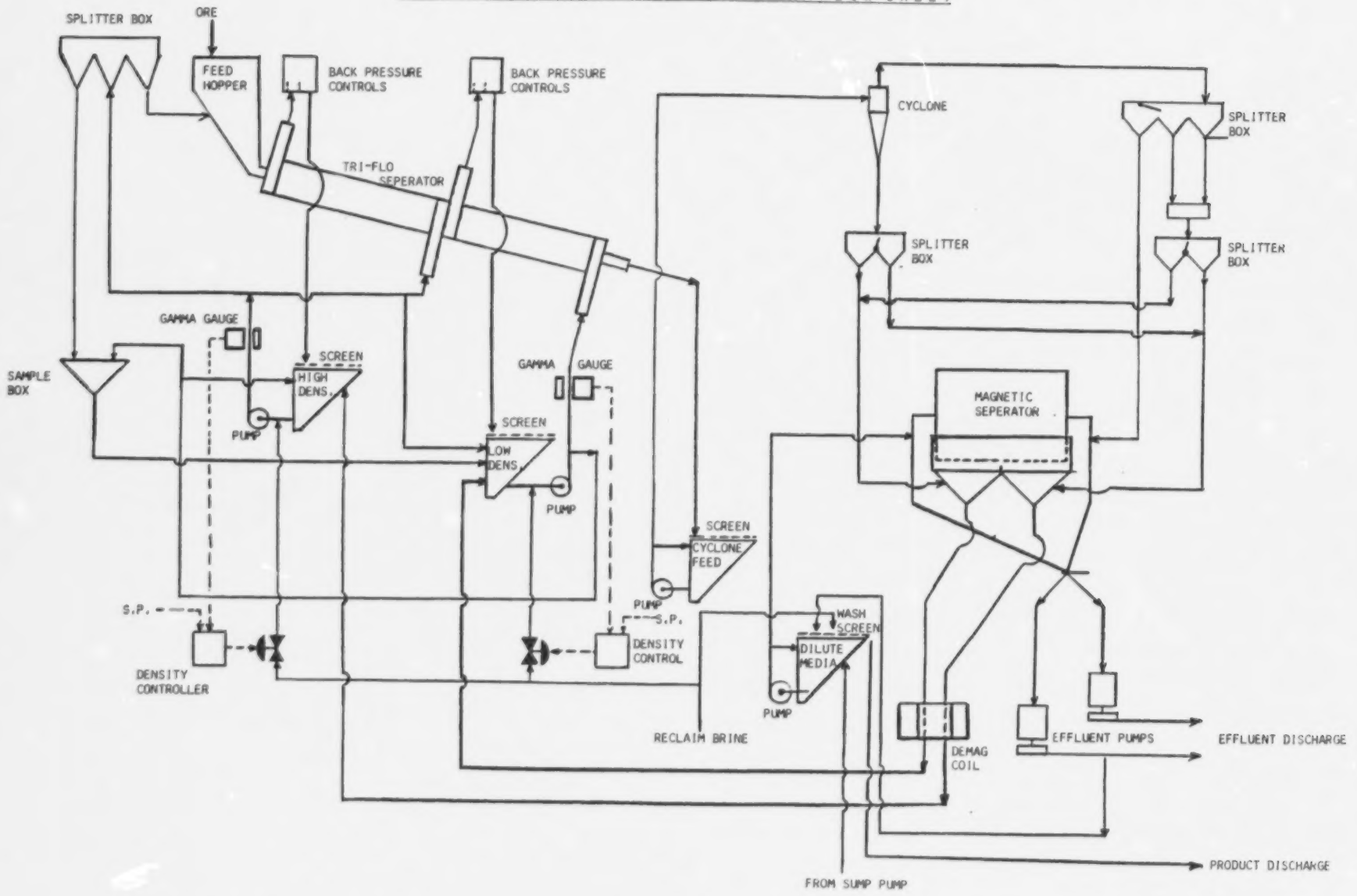



FIG. 1

# APPENDIX B

# HEAVY MEDIA SEPARATION OF POTASH ORE

## PHASE II

## PROGRESS REPORT II

## A. HIGHLIGHT REPORT

## HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

### 1.0 GENERAL

This is the second progress report for the Phase II project and covers the test work and analysis from the Heavy Media Separation Phase II testing program carried out at the Cominco Fertilizers Division, Potash Operations.

### 2.0 SCHEDULE

Test work at the Cominco Potash Operation was conducted from November 2 until December 10, 1987. Additional process laboratory work commenced in January 1988. The analysis and results from this laboratory test work as well as the consulting report covering "The Order of Magnitude Capital Costs" estimates will be included in the final report.

The progress of the project is on schedule, no problems are anticipated in completing this final work phase.

2.1 Overall

| | |
|---|---|
| Control Schedule Completion | March 31, 1988 |
| Probable Completion | March 31, 1988 |

2.2 Milestones

| | |
|---|---|
| Commencement of Laboratory Test Program | January 18, 1988 |

### 3.0 COST SUMMARY

This report includes the expenses incurred till January 31, 1988. The cost analysis will also reflect the actual charges for the period of December 1987, which were previously estimated.

| | | |
|---|---|---|
| 3.1 | Approved Control Cost | $203,000 |
| 3.2 | Estimated Expenditure (To Dec. 31/87) | $223,683 |
| 3.3 | Actual Expenditures (To Dec. 31/87) | $226,692 |
| 3.4 | Expenditures this Period | $ 5,135 |
| | Total Project Cost to Date | $231,827 |

## 3.0 COST SUMMARY - (Continued)

The variance between the estimated expenditure and the actual for the period ending Dec. 31/87 is due to an underestimation of the labour required to dismantle the Pilot Plant in the Concentrator. There were also miscellaneous other charges which resulted in $3,009 increased charges.

Included in the costs for the period of January/88, are the following items for a total of $5,135.

| | Hours | Costs |
|---|---|---|
| a) Labour Cost | | |
| - Process Laboratory Work | 44 | 1,456 |
| - Maintenance (Labour to load Pilot Plant on flat bed trucks) | 36 | 705 |
| b) Meetings | | |
| - Site Report | 35 | 1,340 |
| - Clerical | 10 | 200 |
| c) Project Management | | |
| - Management | 27 | 1,034 |
| - Clerical | 20 | 400 |
| | | $5,135 |

3.5 Expected Final Project Cost 256,100

The next contract plan and report form will cover the period January 1, 1988 till March 31, 1988. None is included with this progress report.

## 4.0 OVERALL PROGRESS REVIEW

The project has progressed as per the schedule. A greater level of effort may be required to complete the laboratory test work and consolidate the final report and thus meet the March 31, 1988 target.

C. Littmann
Vanscoy Office
February 15, 1988

CL/dmw

## B. PROJECT PROGRESS

## HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

## B. PROJECT PROGRESS REPORT

## HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

### 1.0 INTRODUCTION

The following is the second Progress Report on Phase II of the Heavy Media Separation Project. It covers testwork conducted in the period of November and December, 1987 at Potash Operations of Cominco Fertilizers.

The pilot plant was on site for a two month period. Testwork was conducted over a 4 week period with the balance of the time for assembly, debugging and disassembly of the plant.

This testwork involved the operation of a nominal 15 tonne/hour Tri-Flo pilot plant at the Cominco site.

## 2.0 SUMMARY AND CONCLUSIONS

i) The recovery obtained at product grade was slightly less than anticipated from previous testwork but still very good in comparison to recovery of similar size material by conventional flotation.

ii) The three different feed materials with varying degrees of insolubles removal displayed similar grade/recovery relationships.

iii) Particle size appears to affect separation performance at least in the range tested. Further work will be done to establish whether this is a Tri-Flo separation efficiency or an ore liberation problem.

iv) Grade G magnetite when used alone, does not produce sufficient media classification in the Tri-Flo to provide satisfactory separation efficiency. Ferrosilicon with Grade G magnetite produced suitable media classification. Ferrosilicon losses were less than the Grade G magnetite losses.

v) The high density media specific gravity determines the mass fraction and KCl distribution between the tails and the middling.

vi) The float product grade and recovery, within the limits of this testwork, was found to be independent of high density media specific gravity and depended only on low density media specific gravity.

vii) The throughput of the pilot plant was generally limited to 3-5 tonnes/hour. This resulted from a wetter than anticipated feed material which overloaded the already undersized magnetite recovery system.

## 3.0 RECOMMENDATIONS

It is recommended that laboratory heavy media separation testwork be conducted on certain selected samples. This is to establish the following;

1. Partition coefficients and overall separation effficiencies of the Tri-Flo.

2. Confirm by laboratory separation the equivalency of performance of the feeds with varying levels of insolubles removal.

3. Determine if the performance of the Tri-Flo unit on the coarser feed was due to ore liberation or separation efficiency of the Tri-Flo.

## 4.0 DETAILS

### 4.1 PURPOSE

The testwork using continuous pilot scale Tri-Flo separation plant was conducted as the next step in the evaluation of the Tri-Flo separator performance in potash processing.

This phase of the testwork has the following objectives:

1. To verify grade/recovery relationships obtained in the Phase I testwork.

2. To establish performance under continuous operating conditions including:

   i) The effect of ore variations

   ii) The ability to control media density

   iii) The ability to vary the distribution between Tri-Flo products while maintaining desired performance.

3. To observe differences in separation performance between 3 types of wet feed material differing in the degree of insoluble removal prior to Tri-Flo separation.

4. To test the effect on performance of a larger sized feed material.

5. To see if Grade G magnetite alone would perform sufficiently well to eliminate need for Ferrosilicon.

6. To determine the effect of feed rate on performance of the Tri-Flo.

## 4.0 DETAILS - (continued)

### 4.2 PROCEDURE

The Tri-Flo pilot plant arrived at the Cominco plant from the Central Canada Potash site in mid October. The pilot plant set-up and water testing was completed by November 2, 1987. Testwork commenced on this date, continued for six weeks and ended on December 10, 1987.

A manual was written for the operation of the pilot plant and is shown in Appendix 4. The purpose of the manual was to cover the principles of Heavy Media Separation using the Tri-Flo and the operation of the pilot plant.

A testwork schedule is included in Appendix 7 as well as details as to pilot plant feed preparation.

### 4.3 DATA

A total of 143 sets of samples were obtained during the pilot plant campaign. Each set of samples consisted of a Tri-Flo pilot plant feed sample and a sample of each of the three products from the pilot plant (float, middlings and tailings).

Each test is designated as to the type of feed material being tested as follows:

i) SIT - (Secondary Insol Tails) This is crushed ore that has been scrubbed and passed through two stages of insol removal prior to entering the conventional rougher flotation.

ii) PIT - (Primary Insol Tails) This is crushed ore that has been scrubbed and has passed through only one stage of insol removal.

iii) PIF - (Primary Insol Feed) This is crushed ore which has only been scrubbed.

The weights, assays and recoveries, as well as pertinent information for each of these tests, is included in Appendix 1 in chronological (and numerical) order.

## 4.0 DETAILS - (continued)

### 4.3 DATA - (continued)

In the last part of the pilot plant testing program the feed sizing was increased from the crushing plant in order to give a larger average particle size to the pilot plant. These cases are noted in the Appendix 2 data.

Tables I and II in Appendix 5 give typical feed size distributions of the normal and coarse feeds respectively.

Appendix 2 contains a summary of the test work sorted in terms of descending product grade. Test results with similar product grades are listed with the highest recovery first.

Finally, in Appendix 3, the grade versus recovery relationships for each of the 3 different types of feed materials are presented graphically.

### 4.4 RESULTS

**A.** Referring to Appendix 2, a number of points are evident:

i) There appears to be very little difference in grade/recovery performance between the three different types of feed material with varying insol content.

ii) A difference in grade/recovery performance between tests with coarse feed (Designated C) compared with those using normal sized feed material (Designated N) was found. Further work will have to be conducted to establish if this is a result of Tri-Flo efficiency or ore liberation characteristics.

iii) Variations in recovery at similar grades among tests with the same product and other products are quite small and were reproducable. The scatter is believed to be due to density control problems associated with establishing stable operation with such low media volumes.

iv) Tests using Grade G magnetite alone for media yielded much poorer results than did a blend of magnetite and Ferrosilicon (Designated B). Similar results were found in the Central Canada Potash testwork using an even finer grade of magnetite (Grade B). There is the possibility of coarser grade magnetite working, provided the media classification action in the Tri-Flo is sufficient to produce the required media differential across the compartment of the Tri-Flo.

4.0 **DETAILS** - (continued)

4.4 **RESULTS** - (continued)

**B.** Graphical representation of the data included in Appendix 3, verified the results above and in addition provides the following insights.

i) Similar grade/recovery results are obtained for each of the three feeds at virtually all points along the grade curve. This would indicate that the Tri-Flo unit actually deslimes the material as well as separating it into the three products.

ii) Concentrate grade/recovery figures are determined primarily by the low density media specific gravity and are independent, for the most part, from the high density media specific gravity. The high density media specific gravity determines the split between the $S_2$ middling product and the $S_1$ tailing.

iii) The implications of this are that it appears that the proportion of weight and $K_2O$ split between the $S_2$ and $S_1$ products can be varied to suit the needs of a particular operating situation.

iii) Variation in results are due to Tri-Flo plant operation instability because of small media volumes and difficulties in media specific gravity control.

# APPENDIX 1

MASS BALANCE CALCULATIONS

1. Comp Meas Sample : SIT

HI - 2.10 2.110

LO - 2.09 2.070

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.02 | 530.80 | 446.30 | 15.92 | 18.00 | 2.24 | | 25.47 | 58.40 | 1.28 | | | |
| F | 30.50 | 840.80 | 673.40 | 19.91 | 23.00 | 0.99 | 44.02 | 54.40 | 13.25 | 0.63 | 92.79 | 10.05 | 25.69 |
| S2 | 30.27 | 686.90 | 539.50 | 18.55 | 11.00 | 0.48 | 21.57 | 6.34 | 88.89 | 1.07 | 5.30 | 33.02 | 21.39 |
| S1 | 30.27 | 731.90 | 581.10 | 20.60 | 18.00 | 0.77 | 34.41 | 1.43 | 96.08 | 1.66 | 1.91 | 56.93 | 52.92 |
| | | | | | | 2.24 | 100.00 | 25.81 | 58.07 | 1.08 | 100.00 | 100.00 | 100.00 |

2. Comp Meas Sample : SIT

HI - 2.10 2.100

LO - 2.07 2.045

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.75 | 728.60 | 606.60 | 16.74 | 22.00 | 2.78 | | 24.19 | 60.33 | 1.38 | | | |
| F | 30.00 | 809.50 | 647.60 | 20.00 | 23.00 | 1.00 | 34.92 | 54.51 | 13.16 | 0.55 | 90.07 | 7.03 | 16.16 |
| S2 | 30.00 | 833.20 | 679.90 | 18.40 | 18.00 | 0.80 | 27.88 | 6.26 | 89.01 | 1.08 | 8.26 | 37.96 | 25.32 |
| S1 | 30.00 | 958.60 | 751.70 | 21.58 | 25.00 | 1.07 | 37.20 | 0.95 | 96.63 | 1.87 | 1.67 | 55.01 | 58.52 |
| | | | | | | 2.87 | 100.00 | 21.13 | 65.36 | 1.19 | 100.00 | 100.00 | 100.00 |

3. Comp Meas Sample : SIT

HI - 2.10 2.100

LO - 2.05 2.029

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.91 | 597.80 | 499.80 | 16.39 | 19.00 | 2.38 | | 23.91 | 60.89 | 1.26 | | | |
| F | 30.26 | 614.70 | 491.10 | 20.11 | 24.00 | 1.03 | 35.78 | 56.13 | 10.69 | 0.45 | 85.78 | 6.19 | 15.05 |
| S2 | 30.31 | 651.60 | 534.10 | 18.03 | 23.00 | 1.02 | 35.13 | 8.37 | 85.72 | 1.03 | 12.56 | 48.67 | 33.82 |
| S1 | 30.46 | 781.10 | 612.80 | 21.55 | 20.00 | 0.84 | 29.09 | 1.34 | 96.00 | 1.88 | 1.66 | 45.14 | 51.13 |
| | | | | | | 2.89 | 100.00 | 23.42 | 61.86 | 1.07 | 100.00 | 100.00 | 100.00 |

FILE : MASSB1

MASS BALANCE CALCULATIONS

4. Comp Meas Sample : SIT
HI - 2.10 2.110
LO - 2.03 2.025

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 21.71 | 573.30 | 463.40 | 19.17 | 30.00 | 1.82 | | 24.39 | 59.66 | 1.73 | | | |
| F | 30.00 | 937.70 | 711.80 | 24.09 | 12.00 | 0.50 | 26.03 | 60.56 | 3.72 | 0.41 | 71.74 | 1.52 | 7.12 |
| S2 | 60.00 | 800.50 | 609.00 | 23.92 | 10.00 | 0.21 | 10.87 | 32.45 | 46.91 | 1.72 | 16.05 | 8.00 | 12.48 |
| S1 | 30.00 | 1001.50 | 737.00 | 26.41 | 30.00 | 1.20 | 63.10 | 4.25 | 91.36 | 1.91 | 12.20 | 90.48 | 80.40 |
| | | | | | | 1.91 | 100.00 | 21.98 | 63.71 | 1.50 | 100.00 | 100.00 | 100.00 |

5. Comp Meas Sample : SIT
HI - 2.10 2.110
LO - 2.01 1.999

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.29 | 587.20 | 478.70 | 18.48 | 19.00 | 1.90 | | 26.79 | 56.07 | 1.52 | | | |
| F | 30.00 | 902.80 | 714.40 | 20.87 | 12.00 | 0.52 | 25.44 | 60.75 | 3.41 | 0.42 | 64.02 | 1.43 | 8.16 |
| S2 | 60.00 | 720.50 | 577.30 | 19.88 | 15.00 | 0.33 | 16.10 | 38.36 | 37.90 | 1.37 | 25.58 | 10.09 | 16.84 |
| S1 | 30.00 | 880.30 | 686.20 | 22.05 | 28.00 | 1.19 | 58.47 | 4.29 | 91.53 | 1.68 | 10.39 | 88.48 | 75.00 |
| | | | | | | 2.03 | 100.00 | 24.14 | 60.48 | 1.31 | 100.00 | 100.00 | 100.00 |

6. Comp Meas Sample : SIT
HI - 2.10 2.110
LO - 1.99 1.986

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.68 | 848.30 | 708.50 | 16.48 | 18.00 | 1.80 | | 25.64 | 57.82 | 1.59 | | | |
| F | 60.00 | 896.90 | 718.90 | 19.85 | 13.00 | 0.28 | 13.78 | 60.52 | 3.79 | 0.41 | 36.25 | 0.84 | 4.14 |
| S2 | 60.00 | 841.90 | 688.30 | 18.24 | 23.00 | 0.51 | 24.87 | 46.70 | 25.00 | 1.07 | 50.47 | 9.99 | 19.49 |
| S1 | 30.00 | 961.30 | 768.90 | 20.01 | 29.00 | 1.26 | 61.35 | 4.98 | 90.42 | 1.70 | 13.28 | 89.17 | 76.38 |
| | | | | | | 2.06 | 100.00 | 23.01 | 62.21 | 1.37 | 100.00 | 100.00 | 100.00 |

FILE : MASSB2

MASS BALANCE CALCULATIONS

7. Comp Meas Sample : SIT

HI - 2.15 2.154

LO - 2.09 2.088

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.04 | 920.20 | 744.50 | 19.09 | 40.00 | 4.05 | | 25.32 | 58.53 | 1.39 | | | |
| F | 30.00 | 901.10 | 707.30 | 21.51 | 38.00 | 1.62 | 39.76 | 50.07 | 19.91 | 0.83 | 92.76 | 12.21 | 27.44 |
| S2 | 60.00 | 955.40 | 754.40 | 21.04 | 29.00 | 0.62 | 15.26 | 5.11 | 90.82 | 1.09 | 3.63 | 21.38 | 13.83 |
| S1 | 30.00 | 1048.00 | 842.10 | 19.65 | 42.00 | 1.84 | 44.98 | 1.72 | 95.71 | 1.57 | 3.61 | 66.41 | 58.73 |
| | | | | | | 4.08 | 100.00 | 21.46 | 64.83 | 1.20 | 100.00 | 100.00 | 100.00 |

8. Comp Meas Sample : SIT

HI - 2.15 2.155

LO - 2.09 2.090

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.00 | 768.10 | 642.30 | 16.38 | 32.00 | 3.97 | | 23.45 | 61.33 | 1.55 | | | |
| F | 30.00 | 937.70 | 747.40 | 20.29 | 33.00 | 1.43 | 36.48 | 56.64 | 9.81 | 0.53 | 92.96 | 5.63 | 15.83 |
| S2 | 60.00 | 1012.90 | 797.30 | 21.29 | 29.00 | 0.62 | 15.83 | 5.37 | 90.43 | 1.07 | 3.82 | 22.51 | 13.87 |
| S1 | 30.00 | 932.20 | 763.20 | 18.13 | 42.00 | 1.87 | 47.69 | 1.50 | 95.83 | 1.80 | 3.22 | 71.86 | 70.30 |
| | | | | | | 3.93 | 100.00 | 22.23 | 63.59 | 1.22 | 100.00 | 100.00 | 100.00 |

9. Comp Meas Sample : SIT

HI - 2.15 2.159

LO - 2.07 2.060

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.00 | 752.00 | 624.50 | 16.95 | 31.00 | 3.50 | | 23.47 | 61.34 | 1.51 | | | |
| F | 30.00 | 710.00 | 567.70 | 20.04 | 30.00 | 1.31 | 36.60 | 57.75 | 8.03 | 0.55 | 90.74 | 4.75 | 15.37 |
| S2 | 60.00 | 770.00 | 614.40 | 20.21 | 28.00 | 0.61 | 17.05 | 8.58 | 85.33 | 1.09 | 6.28 | 23.53 | 14.19 |
| S1 | 30.00 | 872.00 | 715.90 | 17.90 | 37.00 | 1.65 | 46.35 | 1.50 | 95.64 | 1.99 | 2.98 | 71.71 | 70.44 |
| | | | | | | 3.57 | 100.00 | 23.30 | 61.81 | 1.31 | 100.00 | 100.00 | 100.00 |

FILE : MASSB3

MASS BALANCE CALCULATIONS

10. Comp Meas Sample : SIT
HI - 2.15 2.153
LO - 2.05 2.044

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.34 | 703.40 | 589.00 | 16.26 | 36.00 | 3.69 | | 22.73 | 62.50 | 1.52 | | | |
| F | 30.00 | 844.00 | 659.40 | 21.87 | 29.00 | 1.23 | 33.43 | 58.23 | 7.30 | 0.52 | 85.56 | 3.89 | 13.51 |
| S2 | 60.00 | 729.80 | 584.00 | 19.98 | 35.00 | 0.76 | 20.66 | 11.61 | 80.50 | 1.12 | 10.54 | 26.53 | 17.99 |
| S1 | 30.00 | 960.50 | 704.40 | 18.14 | 38.00 | 1.69 | 45.90 | 1.93 | 95.02 | 1.92 | 3.89 | 69.57 | 68.50 |
| | | | | | | 3.69 | 100.00 | 22.75 | 62.69 | 1.29 | 100.00 | 100.00 | 100.00 |

11. Comp Meas Sample : SIT
HI - 2.15 2.158
LO - 2.03 2.022

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 14.76 | 674.10 | 561.80 | 16.66 | 39.00 | 3.60 | | 23.58 | 61.24 | 1.43 | | | |
| F | 30.00 | 820.00 | 643.30 | 21.55 | 26.00 | 1.11 | 27.27 | 60.06 | 4.56 | 0.36 | 71.55 | 1.99 | 8.17 |
| S2 | 60.00 | 855.00 | 685.20 | 19.86 | 45.00 | 0.98 | 24.11 | 23.32 | 62.07 | 1.01 | 24.56 | 23.92 | 20.25 |
| S1 | 30.00 | 886.60 | 716.50 | 19.19 | 45.00 | 1.98 | 48.62 | 1.83 | 95.33 | 1.77 | 3.89 | 74.09 | 71.58 |
| | | | | | | 4.07 | 100.00 | 22.89 | 62.56 | 1.20 | 100.00 | 100.00 | 100.00 |

12. Comp Meas Sample : SIT
HI - 2.15 2.160
LO - 2.01 2.003

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.70 | 777.60 | 653.20 | 16.00 | 31.00 | 3.98 | | 22.64 | 62.51 | 1.65 | | | |
| F | 30.00 | 884.10 | 677.70 | 23.35 | 22.50 | 0.94 | 23.45 | 60.48 | 3.97 | 0.29 | 60.64 | 1.51 | 5.49 |
| S2 | 30.00 | 797.60 | 618.70 | 21.44 | 29.00 | 1.24 | 30.97 | 26.65 | 56.80 | 1.01 | 35.29 | 28.49 | 25.27 |
| S1 | 30.00 | 1121.90 | 874.90 | 22.02 | 43.00 | 1.83 | 45.59 | 2.09 | 94.81 | 1.88 | 4.07 | 70.00 | 69.24 |
| | | | | | | 4.01 | 100.00 | 23.39 | 61.74 | 1.24 | 100.00 | 100.00 | 100.00 |

FILE : MASSB4

MASS BALANCE CALCULATIONS

13. Comp Meas Sample : SIT

HI - 2.15 -

LO - 1.99 -

NOTE: PROBLEM WITH PRODUCT DISCHARGE AT HIGH TONNAGE.
TEST NOT COMPLETE.

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | - | - | - | - | - | - | | - | - | - | | | |
| F | - | - | - | - | - | - | 0.00 | 58.21 | - | - | - | - | - |
| S2 | - | - | - | - | - | - | 0.00 | - | - | - | - | - | - |
| S1 | - | - | - | - | - | - | 0.00 | - | - | - | - | - | - |
| | | | | | | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 |

14. Comp Meas Sample : SIT

HI - 2.20 2.194

LO - 2.09 2.094

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.66 | 841.80 | 721.80 | 14.26 | 35.00 | 4.60 | | 23.07 | 61.83 | 1.65 | | | |
| F | 30.00 | 753.80 | 615.60 | 18.33 | 56.00 | 2.49 | 54.43 | 43.47 | 30.45 | 0.74 | 96.12 | 27.76 | 29.93 |
| S2 | 30.00 | 785.40 | 651.60 | 17.04 | 32.00 | 1.45 | 31.60 | 2.24 | 95.24 | 1.21 | 2.88 | 50.41 | 28.41 |
| S1 | 60.00 | 788.70 | 617.60 | 21.69 | 30.00 | 0.64 | 13.98 | 1.76 | 93.20 | 4.01 | 1.00 | 21.83 | 41.66 |
| | | | | | | 4.58 | 100.00 | 24.61 | 59.69 | 1.35 | 100.00 | 100.00 | 100.00 |

15. Comp Meas Sample : SIT

HI - 2.20 2.201

LO - 2.07 2.076

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.05 | 806.70 | 663.30 | 17.78 | 34.00 | 4.54 | | 23.08 | 61.72 | 1.74 | | | |
| F | 20.00 | 772.80 | 632.30 | 18.18 | 36.00 | 2.41 | 53.35 | 45.67 | 26.86 | 0.84 | 96.99 | 24.33 | 33.84 |
| S2 | 30.00 | 754.90 | 613.00 | 18.80 | 37.00 | 1.64 | 36.28 | 1.81 | 95.79 | 1.34 | 2.61 | 59.00 | 36.71 |
| S1 | 60.00 | 895.10 | 668.30 | 25.34 | 23.00 | 0.47 | 10.37 | 0.96 | 94.72 | 3.76 | 0.40 | 16.67 | 29.44 |
| | | | | | | 4.51 | 100.00 | 25.12 | 58.91 | 1.32 | 100.00 | 100.00 | 100.00 |

FILE : MASSB5

MASS BALANCE CALCULATIONS

16. Comp Meas Sample : SIT
HI - 2.20 2.208
LO - 2.05 2.052

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.56 | 741.60 | 619.20 | 16.50 | 33.00 | 4.26 | | 23.04 | 62.02 | 1.51 | | | |
| F | 20.00 | 775.40 | 637.70 | 17.76 | 32.00 | 2.15 | 48.22 | 47.90 | 23.47 | 0.70 | 95.12 | 18.78 | 26.49 |
| S2 | 30.00 | 1035.00 | 846.60 | 18.20 | 43.00 | 1.92 | 42.97 | 2.53 | 94.71 | 1.28 | 4.48 | 67.50 | 43.16 |
| S1 | 60.00 | 870.20 | 660.70 | 24.07 | 19.00 | 0.39 | 8.81 | 1.10 | 93.87 | 4.39 | 0.40 | 13.72 | 30.35 |
| | | | | | | 4.46 | 100.00 | 24.28 | 60.29 | 1.27 | 100.00 | 100.00 | 100.00 |

17. Comp Meas Sample : SIT
HI - 2.20 2.193
LO - 2.05 2.059

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.89 | 736.60 | 610.00 | 17.19 | 29.00 | 2.82 | | 23.30 | 61.40 | 1.72 | | | |
| F | 30.00 | 803.90 | 637.80 | 20.66 | 29.00 | 1.25 | 43.95 | 49.62 | 20.63 | 0.82 | 95.07 | 14.59 | 23.08 |
| S2 | 30.00 | 813.00 | 657.70 | 19.10 | 28.00 | 1.23 | 43.26 | 2.34 | 95.07 | 1.23 | 4.41 | 66.20 | 34.08 |
| S1 | 60.00 | 955.40 | 710.80 | 25.60 | 18.00 | 0.36 | 12.79 | 0.93 | 93.30 | 5.23 | 0.52 | 19.21 | 42.84 |
| | | | | | | 2.85 | 100.00 | 22.94 | 62.13 | 1.56 | 100.00 | 100.00 | 100.00 |

18. Comp Meas Sample : SIT
HI - 2.20 2.187
LO - 2.03 2.040

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.00 | 714.90 | 593.50 | 16.98 | 31.00 | 3.23 | | 22.80 | 62.23 | 1.68 | | | |
| F | 30.00 | 807.20 | 632.60 | 21.63 | 32.00 | 1.37 | 43.22 | 51.63 | 17.48 | 0.79 | 93.86 | 12.40 | 23.57 |
| S2 | 30.00 | 1052.90 | 850.20 | 19.25 | 33.00 | 1.45 | 45.92 | 2.93 | 94.04 | 1.32 | 5.66 | 70.89 | 41.83 |
| S1 | 60.00 | 949.90 | 704.30 | 25.86 | 17.00 | 0.34 | 10.86 | 1.04 | 93.74 | 4.61 | 0.48 | 16.71 | 34.57 |
| | | | | | | 3.16 | 100.00 | 23.77 | 60.92 | 1.45 | 100.00 | 100.00 | 100.00 |

FILE : MASSB6

MASS BALANCE CALCULATIONS

19. Comp Meas Sample : SIT

HI - 2.20 2.210

LO - 2.01 2.031

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.76 | 950.00 | 789.10 | 16.94 | 33.00 | 3.51 | | 23.18 | 61.63 | 1.68 | | | |
| F | 30.00 | 843.50 | 660.70 | 21.67 | 34.00 | 1.45 | 39.53 | 52.22 | 16.71 | 0.62 | 91.77 | 10.49 | 17.26 |
| S2 | 30.00 | 843.10 | 690.60 | 18.09 | 42.00 | 1.87 | 51.07 | 3.43 | 93.34 | 1.23 | 7.79 | 75.70 | 44.22 |
| S1 | 60.00 | 1047.50 | 780.50 | 25.49 | 17.00 | 0.34 | 9.40 | 1.07 | 92.49 | 5.82 | 0.45 | 13.81 | 38.52 |
| | | | | | | 3.67 | 100.00 | 22.50 | 62.97 | 1.42 | 100.00 | 100.00 | 100.00 |

20. Comp Meas Sample : SIT

HI - 2.20 2.209

LO - 1.99 2.010

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.39 | 722.20 | 599.20 | 17.03 | 35.00 | 3.83 | | 24.01 | 60.31 | 1.68 | | | |
| F | 30.00 | 881.10 | 684.60 | 22.30 | 36.00 | 1.52 | 36.97 | 53.28 | 15.06 | 0.60 | 87.28 | 8.84 | 16.79 |
| S2 | 30.00 | 677.40 | 551.40 | 18.60 | 50.00 | 2.22 | 53.80 | 5.13 | 90.76 | 1.12 | 12.23 | 77.57 | 45.36 |
| S1 | 60.00 | 1007.80 | 740.90 | 26.48 | 19.00 | 0.38 | 9.23 | 1.19 | 92.66 | 5.46 | 0.49 | 13.59 | 37.94 |
| | | | | | | 4.12 | 100.00 | 22.57 | 62.95 | 1.33 | 100.00 | 100.00 | 100.00 |

21. Comp Meas Sample : SIT

HI - 2.20 2.170

LO - 1.97 1.987

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.03 | 724.30 | 606.40 | 16.28 | 34.00 | 4.22 | | 22.74 | 62.51 | 1.49 | | | |
| F | 30.00 | 842.10 | 652.70 | 22.49 | 36.00 | 1.52 | 34.84 | 54.29 | 13.48 | 0.58 | 85.01 | 7.39 | 16.10 |
| S2 | 21.00 | 750.00 | 617.10 | 17.72 | 39.00 | 2.50 | 57.24 | 5.70 | 89.85 | 1.13 | 14.66 | 80.96 | 51.53 |
| S1 | 60.00 | 910.80 | 679.60 | 25.38 | 17.00 | 0.35 | 7.92 | 0.91 | 93.43 | 5.13 | 0.32 | 11.65 | 32.37 |
| | | | | | | 4.36 | 100.00 | 22.25 | 63.52 | 1.26 | 100.00 | 100.00 | 100.00 |

FILE : MASSB7

MASS BALANCE CALCULATIONS

22. Comp Meas Sample : SIT
HI - 2.20 2.170
LO - 1.95 1.970

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 15.80 | 644.50 | 534.70 | 17.04 | 32.00 | 2.74 | | 21.55 | 64.29 | 1.60 | | | |
| F | 120.00 | 932.50 | 718.50 | 22.95 | 21.00 | 0.22 | 9.13 | 58.98 | 6.34 | 0.29 | 26.01 | 0.88 | 2.01 |
| S2 | 30.00 | 748.90 | 601.40 | 19.70 | 32.00 | 1.40 | 58.00 | 25.56 | 58.62 | 0.92 | 71.61 | 51.58 | 40.44 |
| S1 | 30.00 | 818.90 | 627.80 | 23.34 | 19.00 | 0.79 | 32.87 | 1.50 | 95.32 | 2.31 | 2.38 | 47.54 | 57.55 |
| | | | | | | 2.41 | 100.00 | 20.70 | 65.91 | 1.32 | 100.00 | 100.00 | 100.00 |

23. Comp Meas Sample : PIT
HI - 2.20 2.193
LO - 1.95 1.972

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 8.59 | 956.20 | 766.30 | 19.86 | 36.00 | 5.49 | | 24.00 | 59.88 | 2.13 | | | |
| F | 30.00 | 720.30 | 553.80 | 23.12 | 30.00 | 1.26 | 21.05 | 58.25 | 7.39 | 0.40 | 52.08 | 2.54 | 5.42 |
| S2 | 20.00 | 761.10 | 620.10 | 18.53 | 57.00 | 3.79 | 63.59 | 17.31 | 71.37 | 1.23 | 46.74 | 74.19 | 50.36 |
| S1 | 30.00 | 935.00 | 684.10 | 26.83 | 23.00 | 0.92 | 15.36 | 1.82 | 92.65 | 4.47 | 1.19 | 23.27 | 44.21 |
| | | | | | | 5.96 | 100.00 | 23.55 | 61.17 | 1.55 | 100.00 | 100.00 | 100.00 |

24. Comp Meas Sample : PIT
HI - 2.20 2.195
LO - 1.97 1.993

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 9.38 | 748.40 | 625.70 | 16.39 | 32.00 | 4.66 | | 23.23 | 61.40 | 1.83 | | | |
| F | 20.00 | 859.40 | 671.00 | 21.92 | 37.00 | 2.36 | 50.23 | 49.19 | 21.36 | 0.77 | 94.63 | 18.80 | 24.25 |
| S2 | 30.00 | 748.90 | 604.00 | 19.35 | 46.00 | 2.02 | 43.00 | 3.01 | 93.62 | 1.62 | 4.96 | 70.53 | 43.67 |
| S1 | 60.00 | 914.90 | 667.90 | 27.00 | 16.00 | 0.32 | 6.77 | 1.58 | 89.94 | 7.56 | 0.41 | 10.67 | 32.08 |
| | | | | | | 4.70 | 100.00 | 26.11 | 57.07 | 1.60 | 100.00 | 100.00 | 100.00 |

FILE : MASSB8

MASS BALANCE CALCULATIONS

25. Comp Meas Sample : SIT
HI - 2.18 2.186
LO - 2.09 2.104

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.92 | 725.30 | 606.90 | 16.32 | 33.00 | 3.78 | | 22.86 | 62.19 | 1.62 | | | |
| F | 30.00 | 695.30 | 559.50 | 19.53 | 36.00 | 1.58 | 44.89 | 53.26 | 14.99 | 0.70 | 94.93 | 11.42 | 25.31 |
| S2 | 30.00 | 792.40 | 631.20 | 20.34 | 21.00 | 0.91 | 25.92 | 3.95 | 92.73 | 1.02 | 4.07 | 40.81 | 21.30 |
| S1 | 30.00 | 885.60 | 695.20 | 21.50 | 24.00 | 1.03 | 29.19 | 0.87 | 96.35 | 2.27 | 1.01 | 47.76 | 53.39 |
| | | | | | | 3.51 | 100.00 | 25.18 | 58.89 | 1.24 | 100.00 | 100.00 | 100.00 |

26. Comp Meas Sample : PIF
HI - 2.18 1.179
LO - 2.09 2.100

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 16.38 | 779.40 | 650.40 | 16.55 | 31.00 | 2.58 | | 23.32 | 60.81 | 2.27 | | | |
| F | 30.00 | 727.60 | 572.80 | 21.28 | 33.00 | 1.41 | 49.06 | 52.16 | 16.63 | 0.80 | 94.85 | 14.65 | 24.44 |
| S2 | 60.00 | 746.00 | 589.50 | 20.98 | 30.00 | 0.65 | 22.38 | 4.91 | 90.98 | 1.25 | 4.07 | 36.57 | 17.42 |
| S1 | 60.00 | 855.90 | 647.10 | 24.40 | 40.00 | 0.82 | 28.56 | 1.02 | 95.12 | 3.27 | 1.08 | 48.78 | 58.14 |
| | | | | | | 2.88 | 100.00 | 26.98 | 55.68 | 1.61 | 100.00 | 100.00 | 100.00 |

27. Comp Meas Sample : SIT
HI - 2.18 2.177
LO - 2.09 2.098

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.76 | 787.70 | 647.40 | 17.81 | 36.00 | 2.33 | | 24.32 | 60.38 | 1.12 | | | |
| F | 30.00 | 956.30 | 749.10 | 21.67 | 22.00 | 0.94 | 44.76 | 50.01 | 20.24 | 0.59 | 96.12 | 14.59 | 25.65 |
| S2 | 60.00 | 878.30 | 694.10 | 20.97 | 24.00 | 0.52 | 24.63 | 2.53 | 95.13 | 0.86 | 2.68 | 37.74 | 20.57 |
| S1 | 30.00 | 915.80 | 674.30 | 26.37 | 16.00 | 0.64 | 30.60 | 0.92 | 96.73 | 1.81 | 1.21 | 47.67 | 53.78 |
| | | | | | | 2.10 | 100.00 | 23.29 | 62.10 | 1.03 | 100.00 | 100.00 | 100.00 |

FILE : MASSB9

MASS BALANCE CALCULATIONS

28. Comp Meas Sample : SIT

HI - 2.18 2.172

LO - 2.09 2.103

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 23.80 | 787.70 | 655.50 | 16.78 | 33.00 | 1.88 | | 24.42 | 60.09 | 1.25 | | | |
| F | 30.00 | 750.90 | 597.90 | 20.38 | 23.00 | 1.00 | 53.42 | 48.50 | 22.52 | 0.70 | 96.26 | 21.35 | 36.53 |
| S2 | 60.00 | 666.00 | 543.60 | 18.38 | 20.00 | 0.44 | 23.81 | 3.39 | 93.68 | 0.95 | 3.00 | 39.57 | 22.10 |
| S1 | 60.00 | 929.30 | 690.80 | 25.66 | 21.00 | 0.42 | 22.77 | 0.88 | 96.75 | 1.86 | 0.74 | 39.08 | 41.37 |
| | | | | | | 1.87 | 100.00 | 26.92 | 56.37 | 1.02 | 100.00 | 100.00 | 100.00 |

29. Comp Meas Sample : PIF

HI - 2.18 2.170

LO - 2.09 2.101

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 17.60 | 781.00 | 636.70 | 18.48 | 34.00 | 2.57 | | 26.22 | 56.58 | 1.91 | | | |
| F | 31.00 | 867.90 | 682.20 | 21.40 | 36.00 | 1.49 | 53.75 | 47.17 | 24.51 | 0.82 | 97.67 | 22.91 | 31.26 |
| S2 | 30.00 | 831.50 | 656.70 | 21.02 | 15.00 | 0.65 | 23.25 | 1.76 | 96.09 | 1.12 | 1.58 | 38.86 | 18.47 |
| S1 | 30.00 | 913.50 | 669.20 | 26.74 | 16.00 | 0.64 | 23.00 | 0.85 | 95.57 | 3.08 | 0.75 | 38.24 | 50.26 |
| | | | | | | 2.77 | 100.00 | 25.96 | 57.50 | 1.41 | 100.00 | 100.00 | 100.00 |

FILE : MASSB10

MASS BALANCE CALCULATIONS

30. Comp Meas Sample : PIT
HI - 2.18 2.181
LO - 2.05 2.056 ( ? )

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 23.00 | 727.20 | 609.40 | 16.20 | 32.00 | 1.90 | | 26.88 | 56.04 | 1.41 | | | |
| F | 30.00 | 860.80 | 670.70 | 22.08 | 19.00 | 0.81 | 45.04 | 55.40 | 11.59 | 0.71 | 94.04 | 9.19 | 27.25 |
| S2 | 30.00 | 843.30 | 669.60 | 20.60 | 15.00 | 0.65 | 36.24 | 3.97 | 92.65 | 1.07 | 5.42 | 59.09 | 33.04 |
| S1 | 60.00 | 879.00 | 636.20 | 27.62 | 17.00 | 0.33 | 18.72 | 0.76 | 96.31 | 2.49 | 0.54 | 31.73 | 39.71 |
| | | | | | | 1.79 | 100.00 | 26.53 | 56.82 | 1.17 | 100.00 | 100.00 | 100.00 |

31. Comp Meas Sample : SIT
HI - 2.18 2.178
LO - 2.05 2.066

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 21.13 | 749.10 | 609.40 | 18.65 | 31.00 | 1.95 | | 25.28 | 58.56 | 1.42 | | | |
| F | 30.00 | 736.50 | 574.90 | 21.94 | 19.00 | 0.81 | 43.02 | 51.30 | 18.13 | 0.66 | 94.72 | 12.58 | 26.27 |
| S2 | 30.00 | 672.20 | 545.30 | 18.88 | 16.00 | 0.71 | 37.65 | 2.92 | 94.51 | 0.87 | 4.72 | 57.37 | 30.30 |
| S1 | 60.00 | 863.90 | 639.40 | 25.99 | 18.00 | 0.36 | 19.32 | 0.68 | 96.49 | 2.43 | 0.56 | 30.06 | 43.43 |
| | | | | | | 1.88 | 100.00 | 23.30 | 62.03 | 1.08 | 100.00 | 100.00 | 100.00 |

32. Comp Meas Sample : PIF
HI - 2.18 2.170
LO - 2.05 2.066

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 25.26 | 686.20 | 577.00 | 15.91 | 32.00 | 1.74 | | 24.82 | 58.84 | 1.87 | | | |
| F | 30.00 | 722.80 | 564.30 | 21.93 | 19.00 | 0.81 | 42.51 | 52.24 | 16.47 | 0.83 | 93.23 | 11.50 | 25.33 |
| S2 | 30.00 | 731.20 | 585.40 | 19.94 | 15.00 | 0.65 | 34.41 | 4.08 | 92.55 | 0.99 | 5.90 | 52.30 | 24.46 |
| S1 | 60.00 | 852.70 | 624.20 | 26.80 | 22.00 | 0.44 | 23.08 | 0.90 | 95.55 | 3.03 | 0.87 | 36.20 | 50.20 |
| | | | | | | 1.90 | 100.00 | 23.82 | 60.90 | 1.39 | 100.00 | 100.00 | 100.00 |

FILE : MASSB11

MASS BALANCE CALCULATIONS

33. Comp Meas Sample : PIF
HI - 2.18 2.179
LO - 2.01 2.045

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 8.00 | 689.70 | 569.30 | 17.46 | 33.00 | 5.56 | | 24.50 | 59.30 | 1.92 | | | |
| F | 20.00 | 654.30 | 522.40 | 20.16 | 33.00 | 2.15 | 41.58 | 56.80 | 9.45 | 0.63 | 89.04 | 6.94 | 19.00 |
| S2 | 20.00 | 768.20 | 621.90 | 19.04 | 32.00 | 2.12 | 40.89 | 6.59 | 88.19 | 1.38 | 10.16 | 63.67 | 40.93 |
| S1 | 30.00 | 911.80 | 690.60 | 24.26 | 22.00 | 0.91 | 17.53 | 1.22 | 94.92 | 3.15 | 0.81 | 29.39 | 40.06 |
| | | | | | | 5.17 | 100.00 | 26.53 | 56.63 | 1.38 | 100.00 | 100.00 | 100.00 |

34. Comp Meas Sample : SIT
HI - 2.18 2.179
LO - 2.01 2.045 ( ? )

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 23.40 | 686.10 | 556.10 | 18.95 | 32.00 | 1.81 | | 23.97 | 60.81 | 1.24 | | | |
| F | 30.00 | 707.70 | 557.70 | 21.20 | 15.00 | 0.64 | 38.11 | 57.65 | 8.18 | 0.56 | 89.22 | 5.20 | 19.97 |
| S2 | 30.00 | 726.20 | 587.10 | 19.15 | 16.00 | 0.70 | 41.70 | 6.03 | 89.45 | 1.00 | 10.21 | 62.23 | 39.03 |
| S1 | 60.00 | 903.80 | 665.70 | 26.34 | 17.00 | 0.34 | 20.19 | 0.69 | 96.74 | 2.17 | 0.57 | 32.57 | 40.99 |
| | | | | | | 1.69 | 100.00 | 24.62 | 59.95 | 1.07 | 100.00 | 100.00 | 100.00 |

35. Comp Meas Sample : PIT
HI - 2.18 2.180
LO - 2.01 2.020

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.50 | 666.50 | 552.70 | 17.07 | 31.00 | 2.05 | | 26.63 | 56.43 | 1.41 | | | |
| F | 30.00 | 808.10 | 635.70 | 21.33 | 20.00 | 0.86 | 39.53 | 58.97 | 6.12 | 0.53 | 85.83 | 4.32 | 20.15 |
| S2 | 30.00 | 790.20 | 627.70 | 20.56 | 20.00 | 0.86 | 39.92 | 9.17 | 84.45 | 1.03 | 13.48 | 60.23 | 39.53 |
| S1 | 60.00 | 794.60 | 591.00 | 25.62 | 22.00 | 0.45 | 20.56 | 0.91 | 96.52 | 2.04 | 0.69 | 35.45 | 40.32 |
| | | | | | | 2.17 | 100.00 | 27.16 | 55.97 | 1.04 | 100.00 | 100.00 | 100.00 |

FILE : MASSB12

MASS BALANCE CALCULATIONS

36. Comp Meas Sample : PIT

HI - 2.18 2.167

LO - 1.97 1.978

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 17.50 | 719.50 | 598.20 | 16.86 | 29.00 | 2.25 | | 27.12 | 55.65 | 1.42 | | | |
| F | 30.00 | 670.40 | 522.70 | 22.03 | 15.00 | 0.64 | 28.48 | 59.75 | 4.99 | 0.42 | 64.37 | 2.49 | 11.02 |
| S2 | 30.00 | 797.40 | 647.90 | 18.75 | 26.00 | 1.15 | 51.44 | 17.84 | 70.75 | 1.01 | 34.71 | 63.77 | 47.88 |
| S1 | 60.00 | 910.60 | 682.90 | 25.01 | 22.00 | 0.45 | 20.09 | 1.21 | 95.86 | 2.22 | 0.92 | 33.74 | 41.10 |
| | | | | | | 2.24 | 100.00 | 26.43 | 57.07 | 1.09 | 100.00 | 100.00 | 100.00 |

37. Comp Meas Sample : PIF

HI - 2.18 -

LO - 1.97 1.982

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 19.00 | 793.40 | 661.30 | 16.65 | 26.00 | 1.86 | | 24.21 | 59.68 | 1.99 | | | |
| F | 30.00 | 875.30 | 680.20 | 22.29 | 11.00 | 0.47 | 28.98 | 58.89 | 6.22 | 0.56 | 73.74 | 2.92 | 10.19 |
| S2 | 30.00 | 804.10 | 654.50 | 18.60 | 18.00 | 0.80 | 49.67 | 11.67 | 80.36 | 1.17 | 25.04 | 64.61 | 36.47 |
| S1 | 60.00 | 784.30 | 581.20 | 25.90 | 17.00 | 0.34 | 21.35 | 1.32 | 93.93 | 3.98 | 1.22 | 32.47 | 53.34 |
| | | | | | | 1.61 | 100.00 | 23.14 | 61.77 | 1.59 | 100.00 | 100.00 | 100.00 |

38. Comp Meas Sample : SIT

HI - 2.18 -

LO - 1.97 1.992

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 23.10 | 764.60 | 645.50 | 15.58 | 27.00 | 1.61 | | 23.42 | 61.66 | 1.27 | | | |
| F | 60.00 | 859.40 | 676.60 | 21.27 | 16.00 | 0.34 | 21.27 | 60.06 | 4.47 | 0.45 | 56.02 | 1.51 | 9.08 |
| S2 | 30.00 | 850.80 | 691.20 | 18.76 | 18.00 | 0.80 | 49.38 | 19.68 | 68.02 | 0.83 | 42.62 | 53.45 | 38.87 |
| S1 | 60.00 | 896.00 | 677.10 | 24.43 | 23.00 | 0.47 | 29.35 | 1.06 | 96.45 | 1.87 | 1.36 | 45.04 | 52.05 |
| | | | | | | 1.61 | 100.00 | 22.80 | 62.85 | 1.05 | 100.00 | 100.00 | 100.00 |

FILE : MASSB13

MASS BALANCE CALCULATIONS

39. Comp 2.18 Meas 2.167 Sample : SIT
HI - 2.18 2.167
LO - 1.97 1.978

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 15.60 | 762.80 | 644.40 | 15.52 | 32.00 | 2.83 | | 20.96 | 65.54 | 1.28 | | | |
| F | 30.00 | 674.80 | 535.00 | 20.72 | 17.00 | 0.73 | 29.32 | 60.16 | 4.39 | 0.37 | 67.81 | 2.23 | 10.96 |
| S2 | 30.00 | 786.60 | 633.40 | 19.48 | 24.00 | 1.05 | 42.04 | 18.88 | 69.11 | 1.00 | 30.51 | 50.24 | 42.47 |
| S1 | 30.00 | 837.50 | 648.50 | 22.57 | 17.00 | 0.72 | 28.64 | 1.52 | 95.98 | 1.61 | 1.67 | 47.53 | 46.57 |
| | | | | | | 2.50 | 100.00 | 26.01 | 57.83 | 0.99 | 100.00 | 100.00 | 100.00 |

40. Comp 2.18 Meas 2.160 Sample : SIT
HI - 2.18 2.160
LO - 1.97 1.997

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 17.74 | 627.00 | 508.20 | 18.95 | 31.00 | 2.31 | | 23.72 | 61.11 | 1.34 | | | |
| F | 30.23 | 452.70 | 362.30 | 19.97 | 14.00 | 0.61 | 29.76 | 57.96 | 7.69 | 0.56 | 82.53 | 3.48 | 14.33 |
| S2 | 30.05 | 701.30 | 582.70 | 16.91 | 18.00 | 0.81 | 39.96 | 7.94 | 86.43 | 1.00 | 15.18 | 52.53 | 34.37 |
| S1 | 30.06 | 783.10 | 591.90 | 24.42 | 15.00 | 0.62 | 30.28 | 1.58 | 95.53 | 1.97 | 2.29 | 44.00 | 51.30 |
| | | | | | | 2.03 | 100.00 | 20.90 | 65.75 | 1.16 | 100.00 | 100.00 | 100.00 |

41. Comp 2.18 Meas 2.169 Sample : SIT
HI - 2.18 2.169
LO - 2.01 -

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 19.21 | 667.70 | 566.90 | 15.10 | 31.00 | 2.24 | | 23.65 | 61.32 | 1.24 | | | |
| F | 30.00 | 622.70 | 500.60 | 19.61 | 17.00 | 0.74 | 38.47 | 56.61 | 9.73 | 0.65 | 89.56 | 6.20 | 22.83 |
| S2 | 30.00 | 637.60 | 530.40 | 16.81 | 18.00 | 0.82 | 42.15 | 5.64 | 90.03 | 1.04 | 9.78 | 62.82 | 40.02 |
| S1 | 30.00 | 762.70 | 583.30 | 23.52 | 9.00 | 0.37 | 19.38 | 0.84 | 96.57 | 2.10 | 0.67 | 30.98 | 37.15 |
| | | | | | | 1.93 | 100.00 | 24.32 | 60.41 | 1.10 | 100.00 | 100.00 | 100.00 |

FILE : MASSB14

MASS BALANCE CALCULATIONS

42. Comp Meas Sample : PIF
HI - 2.16 2.159
LO - 2.01 2.045

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.71 | 805.70 | 620.80 | 22.95 | 40.00 | 2.43 | | 23.18 | 61.56 | 1.75 | | | |
| F | 30.00 | 761.00 | 591.60 | 22.26 | 17.50 | 0.74 | 31.77 | 58.31 | 7.03 | 0.66 | 84.26 | 3.50 | 15.94 |
| S2 | 30.00 | 960.40 | 660.80 | 31.20 | 17.00 | 0.64 | 27.31 | 10.74 | 81.83 | 1.17 | 13.34 | 34.98 | 24.30 |
| S1 | 30.00 | 819.70 | 718.30 | 12.37 | 20.00 | 0.95 | 40.92 | 1.29 | 96.04 | 1.92 | 2.40 | 61.52 | 59.75 |
| | | | | | | 2.33 | 100.00 | 21.99 | 63.88 | 1.31 | 100.00 | 100.00 | 100.00 |

43. Comp Meas Sample : PIF
HI - 2.16 2.155
LO - 1.99 2.020 ( ? )

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 18.87 | 860.60 | 707.80 | 17.76 | 34.00 | 2.42 | | 22.11 | 63.23 | 1.77 | | | |
| F | 30.00 | 781.70 | 608.40 | 22.17 | 15.00 | 0.64 | 30.16 | 58.91 | 6.14 | 0.60 | 80.23 | 2.91 | 14.67 |
| S2 | 30.00 | 828.80 | 659.00 | 20.49 | 16.50 | 0.71 | 33.90 | 11.69 | 80.41 | 1.08 | 17.90 | 42.78 | 29.68 |
| S1 | 30.00 | 971.60 | 711.40 | 26.78 | 19.00 | 0.76 | 35.94 | 1.14 | 96.29 | 1.91 | 1.85 | 54.31 | 55.65 |
| | | | | | | 2.11 | 100.00 | 22.14 | 63.72 | 1.23 | 100.00 | 100.00 | 100.00 |

FILE : MASSB15

MASS BALANCE CALCULATIONS

44. Comp Meas Sample : PIF
HI - 2.16 2.150
LO - 1.97 2.005

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 19.58 | 640.70 | 559.60 | 12.66 | 29.00 | 2.11 | | 23.71 | 60.77 | 1.70 | | | |
| F | 30.00 | 735.20 | 582.10 | 20.82 | 9.50 | 0.41 | 24.03 | 59.53 | 5.32 | 0.44 | 62.98 | 2.04 | 8.69 |
| S2 | 30.00 | 906.30 | 645.60 | 19.93 | 16.00 | 0.70 | 40.93 | 19.26 | 68.44 | 1.07 | 34.71 | 44.59 | 36.00 |
| S1 | 30.00 | 1019.70 | 745.50 | 26.89 | 15.00 | 0.60 | 35.04 | 1.50 | 95.71 | 1.92 | 2.31 | 53.37 | 55.30 |
| | | | | | | 1.70 | 100.00 | 22.71 | 62.83 | 1.22 | 100.00 | 100.00 | 100.00 |

45. Comp Meas Sample : PIF
HI - 2.16 2.160
LO - 1.99 2.018

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 27.74 | 774.60 | 663.30 | 14.37 | 30.50 | 1.54 | | 23.33 | 61.48 | 1.59 | | | |
| F | 60.00 | 768.00 | 600.90 | 21.76 | 25.50 | 0.54 | 31.20 | 58.59 | 6.72 | 0.53 | 80.14 | 3.35 | 12.52 |
| S2 | 60.00 | 784.00 | 631.40 | 19.46 | 26.00 | 0.57 | 32.75 | 12.28 | 79.43 | 1.13 | 17.63 | 41.57 | 28.01 |
| S1 | 60.00 | 879.70 | 654.10 | 25.65 | 31.00 | 0.63 | 36.05 | 1.41 | 95.59 | 2.18 | 2.23 | 55.07 | 59.48 |
| | | | | | | 1.74 | 100.00 | 22.81 | 62.57 | 1.32 | 100.00 | 100.00 | 100.00 |

46. Comp Meas Sample : PIF
HI - 2.16 2.154
LO - 2.01 2.046

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 17.40 | 830.10 | 673.80 | 18.83 | 29.00 | 2.21 | | 25.28 | 58.39 | 1.59 | | | |
| F | 30.00 | 833.20 | 654.50 | 21.45 | 20.00 | 0.86 | 36.87 | 55.87 | 10.86 | 0.70 | 87.37 | 6.52 | 20.66 |
| S2 | 30.00 | 857.10 | 702.50 | 18.04 | 20.00 | 0.89 | 38.47 | 6.99 | 87.84 | 1.09 | 11.41 | 55.02 | 33.56 |
| S1 | 30.00 | 980.00 | 735.30 | 24.97 | 14.00 | 0.57 | 24.65 | 1.17 | 95.83 | 2.32 | 1.22 | 38.46 | 45.78 |
| | | | | | | 2.32 | 100.00 | 23.58 | 61.42 | 1.25 | 100.00 | 100.00 | 100.00 |

FILE : MASSB16

MASS BALANCE CALCULATIONS

47. Comp Meas Sample : PIF
HI - 2.07 2.076
LO - 2.01 2.008

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.00 | 710.70 | 595.70 | 16.18 | 36.00 | 4.11 | | 25.73 | 57.19 | 2.08 | | | |
| F | 30.00 | 661.80 | 512.40 | 22.57 | 20.70 | 0.87 | 24.75 | 59.40 | 5.58 | 0.39 | 61.96 | 2.26 | 7.74 |
| S2 | 60.00 | 686.30 | 539.50 | 21.39 | 23.00 | 0.49 | 13.96 | 28.65 | 53.56 | 1.09 | 16.86 | 12.22 | 12.20 |
| S1 | 30.00 | 594.90 | 469.40 | 21.10 | 50.30 | 2.16 | 61.29 | 8.20 | 85.39 | 1.63 | 21.18 | 85.53 | 80.07 |
| | | | | | | 3.53 | 100.00 | 23.73 | 61.19 | 1.25 | 100.00 | 100.00 | 100.00 |

48. Comp Meas Sample : PIF
HI - 2.08 2.094
LO - 1.99 2.012

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 15.80 | 585.90 | 495.20 | 15.48 | 29.00 | 2.53 | | 24.78 | 58.42 | 2.35 | | | |
| F | 30.00 | 855.90 | 653.60 | 23.64 | 18.00 | 0.75 | 34.40 | 57.96 | 7.67 | 0.58 | 82.65 | 4.38 | 12.56 |
| S2 | 70.00 | 712.50 | 550.10 | 22.79 | 25.00 | 0.45 | 20.70 | 12.95 | 78.15 | 1.35 | 11.11 | 26.86 | 17.60 |
| S1 | 30.00 | 681.70 | 531.80 | 21.99 | 23.00 | 0.98 | 44.90 | 3.35 | 92.23 | 2.47 | 6.24 | 68.76 | 69.84 |
| | | | | | | 2.18 | 100.00 | 24.12 | 60.23 | 1.59 | 100.00 | 100.00 | 100.00 |

FILE : MASSB17

MASS BALANCE CALCULATIONS

49. Comp Meas Sample : PIF
HI - 2.075 2.075
LO - 2.01 2.000

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 17.30 | 517.20 | 438.30 | 15.26 | 33.00 | 2.64 | | 23.33 | 61.19 | 1.88 | | | |
| F | 30.00 | 673.50 | 537.40 | 20.21 | 27.00 | 1.17 | 44.66 | 59.00 | 6.05 | 0.55 | 87.58 | 5.31 | 16.92 |
| S2 | 60.00 | 628.80 | 497.80 | 20.83 | 13.00 | 0.28 | 10.67 | 20.57 | 66.10 | 1.34 | 7.29 | 13.85 | 9.85 |
| S1 | 30.00 | 793.70 | 633.50 | 20.18 | 27.00 | 1.17 | 44.67 | 3.45 | 92.16 | 2.38 | 5.12 | 80.85 | 73.24 |
| | | | | | | 2.63 | 100.00 | 30.08 | 50.92 | 1.45 | 100.00 | 100.00 | 100.00 |

50. Comp Meas Sample : PIF
HI - 2.075 2.076
LO - 2.02 2.000

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 14.70 | 655.70 | 550.40 | 16.06 | 32.00 | 2.98 | | 23.04 | 60.97 | 2.56 | | | |
| F | 30.00 | 667.00 | 549.60 | 17.60 | 29.00 | 1.30 | 32.57 | 58.84 | 6.21 | 0.64 | 77.88 | 3.41 | 11.85 |
| S2 | 60.00 | 654.60 | 517.10 | 21.01 | 36.00 | 0.77 | 19.38 | 18.57 | 69.27 | 1.33 | 14.63 | 22.65 | 14.66 |
| S1 | 31.00 | 803.00 | 650.00 | 19.05 | 45.00 | 1.92 | 48.05 | 3.84 | 91.23 | 2.69 | 7.50 | 73.94 | 73.49 |
| | | | | | | 3.99 | 100.00 | 24.61 | 59.28 | 1.76 | 100.00 | 100.00 | 100.00 |

51. Comp Meas Sample : PIF
HI - 2.075 2.08
LO - 2.00 1.97

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 19.00 | 587.00 | 503.80 | 14.17 | 35.00 | 2.58 | | 23.54 | 60.38 | 2.36 | | | |
| F | 60.00 | 695.20 | 563.80 | 18.90 | 27.00 | 0.60 | 24.32 | 60.08 | 4.41 | 0.48 | 63.66 | 1.73 | 6.61 |
| S2 | 60.00 | 587.60 | 468.60 | 20.25 | 23.00 | 0.50 | 20.37 | 30.00 | 51.17 | 1.34 | 26.63 | 16.84 | 15.45 |
| S1 | 30.00 | 667.90 | 536.40 | 19.69 | 31.00 | 1.36 | 55.31 | 4.03 | 91.13 | 2.49 | 9.71 | 81.43 | 77.94 |
| | | | | | | 2.45 | 100.00 | 22.95 | 61.90 | 1.77 | 100.00 | 100.00 | 100.00 |

FILE : MASSB18

MASS BALANCE CALCULATIONS

S2. Comp Meas Sample : PIF
HI - 2.075 2.096
LO - 2.02 2.012

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.15 | 584.20 | 482.00 | 17.49 | 34.00 | 3.77 | | 23.71 | 60.47 | 2.00 | | | |
| F | 30.00 | 717.50 | 569.20 | 20.67 | 23.00 | 0.99 | 26.93 | 58.97 | 6.12 | 0.53 | 70.25 | 2.63 | 9.30 |
| S2 | 30.00 | 648.40 | 506.20 | 21.93 | 23.00 | 0.98 | 26.50 | 19.38 | 67.97 | 1.35 | 22.72 | 28.74 | 23.32 |
| S1 | 30.00 | 909.70 | 700.00 | 23.05 | 41.00 | 1.72 | 46.57 | 3.41 | 92.38 | 2.22 | 7.02 | 68.63 | 67.38 |
| | | | | | | 3.69 | 100.00 | 22.61 | 62.68 | 1.53 | 100.00 | 100.00 | 100.00 |

S3. Comp Meas Sample : PIF
HI - 2.075 2.090
LO - 2.00 1.975

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.78 | 632.00 | 530.00 | 16.14 | 35.00 | 4.45 | | 22.88 | 61.58 | 2.20 | | | |
| F | 30.00 | 600.60 | 481.50 | 19.83 | 18.00 | 0.79 | 19.21 | 59.73 | 5.04 | 0.41 | 52.00 | 1.52 | 5.69 |
| S2 | 30.00 | 628.50 | 503.60 | 19.87 | 30.00 | 1.31 | 32.00 | 27.79 | 54.89 | 1.12 | 40.30 | 27.58 | 25.91 |
| S1 | 30.00 | 689.10 | 561.10 | 18.57 | 45.00 | 1.99 | 48.78 | 3.48 | 92.53 | 1.94 | 7.69 | 70.90 | 68.40 |
| | | | | | | 4.09 | 100.00 | 22.07 | 63.68 | 1.38 | 100.00 | 100.00 | 100.00 |

S4. Comp Meas Sample : PIF
HI - 2.065 2.08
LO - 2.03 2.01

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.77 | 550.10 | 490.90 | 10.76 | 26.00 | 1.82 | | 22.44 | 62.17 | 2.31 | | | |
| F | 60.00 | 622.60 | 506.20 | 18.70 | 21.00 | 0.46 | 28.11 | 60.14 | 4.30 | 0.50 | 75.08 | 1.93 | 7.53 |
| S2 | 60.00 | 547.70 | 440.00 | 19.66 | 9.00 | 0.20 | 11.90 | 27.53 | 54.92 | 1.50 | 14.55 | 10.46 | 9.57 |
| S1 | 30.00 | 707.20 | 560.10 | 20.80 | 23.00 | 0.99 | 59.98 | 3.89 | 91.26 | 2.58 | 10.36 | 87.60 | 82.90 |
| | | | | | | 1.65 | 100.00 | 22.52 | 62.49 | 1.87 | 100.00 | 100.00 | 100.00 |

FILE : MASSB19

MASS BALANCE CALCULATIONS

55. Comp Meas Sample : PIF
HI - 2.065 2.085
LO - 2.03 2.012

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 9.87 | 675.60 | 567.00 | 16.07 | 26.00 | 3.61 | | 24.48 | 59.05 | 2.20 | | | |
| F | 30.00 | 767.90 | 617.60 | 19.57 | 27.00 | 1.18 | 30.30 | 59.16 | 5.86 | 0.49 | 75.49 | 2.92 | 8.90 |
| S2 | 30.00 | 750.40 | 599.00 | 20.18 | 17.00 | 0.74 | 18.93 | 19.83 | 67.29 | 1.32 | 15.81 | 20.97 | 14.99 |
| S1 | 30.00 | 701.50 | 567.30 | 19.13 | 45.00 | 1.98 | 50.77 | 4.07 | 91.06 | 2.50 | 8.70 | 76.11 | 76.11 |
| | | | | | | 3.90 | 100.00 | 23.74 | 60.75 | 1.67 | 100.00 | 100.00 | 100.00 |

56. Comp Meas Sample : PIF
HI - 2.065 2.081
LO - 2.045 2.024

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.42 | 678.40 | 572.20 | 15.65 | 32.00 | 3.55 | | 24.21 | 59.44 | 2.23 | | | |
| F | 30.00 | 693.90 | 557.90 | 19.60 | 28.00 | 1.23 | 32.61 | 56.84 | 9.41 | 0.61 | 81.87 | 4.90 | 13.50 |
| S2 | 30.00 | 767.10 | 610.20 | 20.45 | 16.00 | 0.69 | 18.44 | 13.18 | 77.67 | 1.47 | 10.73 | 22.85 | 18.40 |
| S1 | 30.00 | 773.50 | 622.20 | 19.56 | 42.00 | 1.84 | 48.95 | 3.42 | 92.54 | 2.05 | 7.39 | 72.26 | 68.10 |
| | | | | | | 3.76 | 100.00 | 22.64 | 62.68 | 1.47 | 100.00 | 100.00 | 100.00 |

57. Comp Meas Sample : PIF
HI - 2.055 2.076
LO - 2.045 2.036

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 9.77 | 656.50 | 551.40 | 16.01 | 29.00 | 4.07 | | 24.26 | 59.53 | 2.07 | | | |
| F | 30.00 | 462.00 | 384.30 | 16.82 | 30.00 | 1.36 | 37.78 | 58.38 | 6.97 | 0.61 | 84.80 | 4.59 | 16.20 |
| S2 | 60.00 | 518.80 | 420.10 | 19.02 | 28.00 | 0.62 | 17.16 | 13.68 | 77.09 | 1.25 | 9.03 | 23.05 | 15.06 |
| S1 | 30.00 | 758.30 | 594.00 | 21.67 | 38.00 | 1.62 | 45.06 | 3.56 | 92.19 | 2.17 | 6.17 | 72.37 | 68.73 |
| | | | | | | 3.60 | 100.00 | 26.01 | 57.41 | 1.42 | 100.00 | 100.00 | 100.00 |

FILE : MASSB20

MASS BALANCE CALCULATIONS

58. Comp Meas Sample : PIF
HI - 2.055 2.078
LO - 2.030 2.019

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.56 | 571.50 | 478.20 | 16.33 | 31.00 | 3.67 | | 24.03 | 59.81 | 2.15 | | | |
| F | 30.00 | 715.60 | 575.80 | 19.54 | 30.00 | 1.31 | 35.45 | 57.20 | 8.81 | 0.64 | 85.36 | 5.13 | 14.73 |
| S2 | 45.00 | 890.20 | 706.30 | 20.66 | 24.00 | 0.69 | 18.64 | 11.34 | 80.74 | 1.31 | 8.90 | 24.74 | 15.85 |
| S1 | 30.00 | 767.80 | 599.90 | 21.87 | 40.00 | 1.70 | 45.90 | 2.97 | 92.97 | 2.33 | 5.74 | 70.13 | 69.42 |
| | | | | | | 3.71 | 100.00 | 23.76 | 60.85 | 1.54 | 100.00 | 100.00 | 100.00 |

59. Comp Meas Sample : PIF
HI - 2.055 2.082
LO - 2.010 1.994

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.60 | 781.70 | 660.60 | 15.49 | 28.00 | 3.65 | | 24.47 | 59.05 | 2.21 | | | |
| F | 30.00 | 534.20 | 431.50 | 19.23 | 27.00 | 1.19 | 31.59 | 58.77 | 6.48 | 0.49 | 78.74 | 3.34 | 10.30 |
| S2 | 60.00 | 650.00 | 514.70 | 20.82 | 40.00 | 0.86 | 22.94 | 15.94 | 73.47 | 1.30 | 15.51 | 27.55 | 19.84 |
| S1 | 30.00 | 768.10 | 602.80 | 21.52 | 40.00 | 1.71 | 45.47 | 2.98 | 92.97 | 2.31 | 5.75 | 69.11 | 69.87 |
| | | | | | | 3.76 | 100.00 | 23.58 | 61.17 | 1.50 | 100.00 | 100.00 | 100.00 |

60. Comp Meas Sample : PIF
HI - 2.030 2.055
LO - 2.010 1.999

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 30.45 | 744.10 | 639.10 | 14.11 | 30.00 | 1.38 | | 23.34 | 60.93 | 2.12 | | | |
| F | 30.00 | 652.80 | 531.00 | 18.66 | 27.00 | 1.20 | 29.14 | 58.32 | 7.14 | 0.54 | 75.55 | 3.31 | 10.47 |
| S2 | 45.00 | 682.30 | 543.70 | 20.31 | 27.00 | 0.78 | 19.03 | 16.30 | 72.90 | 1.30 | 13.79 | 22.07 | 16.46 |
| S1 | 30.00 | 861.30 | 700.70 | 18.65 | 48.00 | 2.13 | 51.82 | 4.63 | 90.55 | 2.12 | 10.66 | 74.62 | 73.07 |
| | | | | | | 4.10 | 100.00 | 22.50 | 62.88 | 1.50 | 100.00 | 100.00 | 100.00 |

FILE : MASSB21

MASS BALANCE CALCULATIONS

61. Comp Meas Sample : PIF
HI - 2.030 2.062
LO - 2.030 2.023

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.78 | 771.50 | 645.20 | 16.37 | 30.00 | 3.80 | | 23.92 | 60.18 | 1.95 | | | |
| F | 30.00 | 729.60 | 585.60 | 19.74 | 29.00 | 1.27 | 34.25 | 59.30 | 5.56 | 0.57 | 81.56 | 3.21 | 14.30 |
| S2 | 60.00 | 723.70 | 567.30 | 21.61 | 27.00 | 0.58 | 15.57 | 16.76 | 72.24 | 1.23 | 10.48 | 18.99 | 14.03 |
| S1 | 30.00 | 796.40 | 631.70 | 20.68 | 43.00 | 1.86 | 50.18 | 3.95 | 91.80 | 1.95 | 7.96 | 77.79 | 71.67 |
| | | | | | | 3.70 | 100.00 | 24.90 | 59.22 | 1.37 | 100.00 | 100.00 | 100.00 |

62. Comp Meas Sample : PIF
HI - 2.010 2.045
LO - 2.030 2.020

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 15.59 | 521.70 | 464.40 | 10.98 | 32.00 | 2.98 | | 21.61 | 63.59 | 2.20 | | | |
| F | 30.00 | 739.30 | 599.30 | 18.94 | 23.00 | 1.02 | 31.46 | 58.76 | 6.36 | 0.62 | 80.98 | 3.21 | 12.67 |
| S2 | 60.00 | 769.50 | 610.00 | 20.73 | 15.00 | 0.32 | 10.03 | 15.18 | 74.58 | 1.39 | 6.67 | 12.01 | 9.06 |
| S1 | 20.00 | 901.30 | 744.10 | 17.44 | 28.00 | 1.89 | 58.51 | 4.82 | 90.31 | 2.06 | 12.35 | 84.78 | 78.28 |
| | | | | | | 3.23 | 100.00 | 22.83 | 62.32 | 1.54 | 100.00 | 100.00 | 100.00 |

63. Comp Meas Sample : PIF
HI - 2.010 2.049
LO - 2.010 1.968

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 13.59 | 523.90 | 450.70 | 13.97 | 29.00 | 3.00 | | 22.82 | 61.76 | 2.12 | | | |
| F | 60.00 | 664.00 | 531.60 | 19.94 | 31.00 | 0.68 | 25.37 | 59.13 | 5.89 | 0.51 | 70.92 | 2.30 | 8.09 |
| S2 | 60.00 | 739.20 | 583.00 | 21.13 | 17.00 | 0.37 | 13.70 | 23.22 | 61.85 | 1.39 | 15.05 | 13.06 | 11.91 |
| S1 | 20.00 | 749.80 | 596.00 | 20.51 | 25.00 | 1.62 | 60.93 | 4.87 | 90.19 | 2.10 | 14.03 | 84.65 | 80.00 |
| | | | | | | 2.66 | 100.00 | 21.15 | 64.92 | 1.60 | 100.00 | 100.00 | 100.00 |

FILE : MASSB22

MASS BALANCE CALCULATIONS

64. Comp Meas Sample : PIF
HI - 2.010 2.044
LO - 2.010 1.984

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.50 | 856.10 | 727.10 | 15.07 | 33.20 | 4.00 | | 23.31 | 60.82 | 2.28 | | | |
| F | 60.00 | 562.00 | 454.30 | 19.16 | 24.00 | 0.53 | 14.60 | 60.59 | 3.75 | 0.33 | 44.03 | 0.82 | 2.92 |
| S2 | 60.00 | 721.90 | 571.70 | 20.81 | 23.50 | 0.51 | 14.00 | 39.25 | 36.87 | 1.00 | 27.36 | 7.76 | 8.48 |
| S1 | 20.00 | 783.50 | 601.60 | 23.22 | 41.20 | 2.58 | 71.40 | 8.05 | 85.21 | 2.05 | 28.61 | 91.42 | 88.61 |
| | | | | | | 3.62 | 100.00 | 20.09 | 66.55 | 1.65 | 100.00 | 100.00 | 100.00 |

65. Comp Meas Sample : PIF
HI - 2.050 2.053
LO - 2.010 1.979

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | - | 812.90 | 707.20 | 13.00 | 0.00 | ERR | | 21.13 | 64.50 | 2.05 | | | |
| F | 120.00 | 591.80 | 475.20 | 19.70 | 25.00 | 0.27 | 10.98 | 61.19 | 2.84 | 0.29 | 31.00 | 0.49 | 2.11 |
| S2 | 90.00 | 803.80 | 646.30 | 19.59 | 33.00 | 0.48 | 19.36 | 44.61 | 28.41 | 0.97 | 39.83 | 8.57 | 12.45 |
| S1 | 30.00 | 843.80 | 671.40 | 20.43 | 40.00 | 1.73 | 69.66 | 9.08 | 83.78 | 1.85 | 29.17 | 90.94 | 85.44 |
| | | | | | | 2.49 | 100.00 | 21.68 | 64.17 | 1.51 | 100.00 | 100.00 | 100.00 |

66. Comp Meas Sample : PIF
HI - 2.050 2.059
LO - 2.010 1.974

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 8.42 | 753.50 | 639.00 | 15.20 | 38.00 | 6.25 | | 23.08 | 62.18 | 1.28 | | | |
| F | 30.00 | 794.00 | 630.40 | 20.60 | 27.00 | 1.17 | 21.17 | 60.34 | 4.17 | 0.31 | 54.37 | 1.44 | 4.95 |
| S2 | 30.00 | 740.70 | 592.90 | 19.95 | 30.00 | 1.31 | 23.71 | 30.50 | 50.64 | 1.08 | 30.78 | 19.53 | 19.33 |
| S1 | 20.00 | 716.20 | 598.90 | 16.38 | 44.50 | 3.04 | 55.12 | 6.33 | 88.16 | 1.82 | 14.85 | 79.03 | 75.72 |
| | | | | | | 5.51 | 100.00 | 23.49 | 61.48 | 1.32 | 100.00 | 100.00 | 100.00 |

FILE : MASSB23

MASS BALANCE CALCULATIONS

67. Comp 2.050 Meas 2.057 Sample : PIF
HI - 2.050
LO - 2.010 2.000

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | - | 743.00 | 637.70 | 14.17 | - | ERR | | 23.39 | 61.13 | 1.84 | | | |
| F | 45.00 | 776.60 | 609.60 | 21.50 | 32.40 | 0.92 | 17.60 | 59.81 | 4.96 | 0.36 | 49.98 | 1.34 | 4.47 |
| S2 | 30.00 | 774.80 | 610.20 | 21.24 | 25.00 | 1.07 | 20.44 | 32.17 | 47.96 | 1.11 | 31.22 | 15.03 | 16.00 |
| S1 | 15.00 | 704.90 | 576.40 | 18.23 | 36.50 | 3.25 | 61.96 | 6.39 | 88.06 | 1.82 | 18.80 | 83.64 | 79.53 |
| | | | | | | 5.25 | 100.00 | 21.06 | 65.24 | 1.42 | 100.00 | 100.00 | 100.00 |

68. Comp 2.050 Meas 2.057 Sample : PIF
HI - 2.050
LO - 2.010 1.992

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 777.30 | 673.50 | 13.35 | 0.00 | ERR | | 22.67 | 62.02 | 2.09 | | | |
| F | 30.00 | 790.00 | 628.90 | 20.39 | 36.20 | 1.57 | 26.03 | 58.71 | 6.63 | 0.43 | 68.34 | 2.73 | 7.59 |
| S2 | 30.00 | 881.00 | 699.40 | 20.61 | 31.50 | 1.36 | 22.59 | 19.86 | 67.19 | 1.37 | 20.06 | 24.04 | 20.98 |
| S1 | 15.00 | 810.10 | 649.20 | 19.86 | 35.50 | 3.10 | 51.39 | 5.05 | 89.96 | 2.05 | 11.61 | 73.23 | 71.43 |
| | | | | | | 6.03 | 100.00 | 22.36 | 63.13 | 1.47 | 100.00 | 100.00 | 100.00 |

69. Comp 2.050 Meas 2.061 Sample : PIF
HI - 2.050
LO - 2.010 1.987

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ ( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 633.60 | 553.80 | 12.59 | 0.00 | ERR | | 21.78 | 63.34 | 2.18 | | | |
| F | 20.00 | 793.50 | 643.40 | 18.92 | 25.00 | 1.66 | 27.71 | 58.19 | 7.32 | 0.56 | 74.76 | 3.15 | 10.17 |
| S2 | 20.00 | 727.90 | 688.30 | 5.44 | 25.50 | 1.97 | 32.96 | 13.64 | 77.13 | 1.28 | 20.84 | 39.51 | 27.66 |
| S1 | 20.00 | 829.20 | 582.10 | 29.80 | 41.00 | 2.35 | 39.34 | 2.41 | 93.77 | 2.41 | 4.40 | 57.34 | 62.17 |
| | | | | | | 5.98 | 100.00 | 21.57 | 64.34 | 1.53 | 100.00 | 100.00 | 100.00 |

FILE : MASSB24

MASS BALANCE CALCULATIONS

70. Comp Meas Sample : PIF
HI - 2.050 2.091
LO - 2.010 2.009

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.31 | 758.30 | 643.10 | 15.19 | 43.00 | 5.78 | | 23.10 | 60.90 | 2.53 | | | |
| F | 20.00 | 795.30 | 642.90 | 19.16 | 34.00 | 2.24 | 36.68 | 52.48 | 16.21 | 0.71 | 87.97 | 9.34 | 15.50 |
| S2 | 20.00 | 847.10 | 688.70 | 18.70 | 26.50 | 1.76 | 28.75 | 6.68 | 87.93 | 1.50 | 8.78 | 39.70 | 25.67 |
| S1 | 20.00 | 858.70 | 706.00 | 17.78 | 31.50 | 2.12 | 34.56 | 2.06 | 93.88 | 2.86 | 3.25 | 50.96 | 58.83 |
| | | | | | | 6.12 | 100.00 | 21.88 | 63.68 | 1.68 | 100.00 | 100.00 | 100.00 |

71. Comp Meas Sample : PIF
HI - 2.020 2.056
LO - 1.980 1.952

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 836.00 | 717.30 | 14.20 | 0.00 | ERR | | 20.63 | 65.19 | 2.15 | | | |
| F | 20.00 | 687.70 | 553.50 | 19.51 | 18.00 | 1.18 | 27.63 | 56.28 | 10.33 | 0.58 | 79.16 | 4.26 | 8.03 |
| S2 | 20.00 | 880.30 | 712.30 | 19.08 | 16.00 | 1.06 | 24.69 | 11.27 | 80.62 | 1.54 | 14.17 | 29.75 | 19.06 |
| S1 | 20.00 | 714.90 | 586.00 | 18.03 | 30.50 | 2.04 | 47.68 | 2.75 | 92.60 | 3.05 | 6.67 | 65.99 | 72.90 |
| | | | | | | 4.28 | 100.00 | 19.64 | 66.91 | 1.99 | 100.00 | 100.00 | 100.00 |

72. Comp Meas Sample : PIF
HI - 2.020 2.032
LO - 1.980 1.962

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 719.70 | 616.70 | 14.31 | 0.00 | ERR | | 21.06 | 64.61 | 2.05 | | | |
| F | 20.00 | 787.60 | 632.50 | 19.69 | 27.50 | 1.80 | 27.37 | 59.77 | 5.03 | 0.35 | 69.69 | 2.35 | 5.51 |
| S2 | 20.00 | 835.10 | 678.30 | 18.78 | 22.00 | 1.46 | 22.15 | 20.52 | 66.05 | 1.47 | 19.36 | 23.94 | 18.72 |
| S1 | 20.00 | 851.20 | 730.00 | 14.24 | 47.50 | 3.33 | 50.49 | 5.09 | 89.33 | 2.61 | 10.95 | 73.81 | 75.77 |
| | | | | | | 6.59 | 100.00 | 23.47 | 61.10 | 1.74 | 100.00 | 100.00 | 100.00 |

FILE : MASSB25

MASS BALANCE CALCULATIONS

73. Comp Meas Sample : PIF
HI - 2.020 2.033
LO - 1.980 1.939

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.09 | 695.60 | 596.30 | 14.25 | 38.00 | 2.65 | | 24.44 | 59.39 | 1.92 | | | |
| F | 45.00 | 838.50 | 679.20 | 19.00 | 12.50 | 0.37 | 14.67 | 61.50 | 2.36 | 0.28 | 42.31 | 0.53 | 2.94 |
| S2 | 45.00 | 753.10 | 594.50 | 21.06 | 17.00 | 0.49 | 19.45 | 41.21 | 33.88 | 0.88 | 37.58 | 10.16 | 12.24 |
| S1 | 30.00 | 891.40 | 692.70 | 22.29 | 39.00 | 1.65 | 65.88 | 6.51 | 87.89 | 1.80 | 20.11 | 89.30 | 84.82 |
| | | | | | | 2.50 | 100.00 | 21.33 | 64.84 | 1.40 | 100.00 | 100.00 | 100.00 |

74. Comp Meas Sample : PIF
HI - 2.020 2.021
LO - 1.980 1.945

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 665.30 | 602.30 | 9.47 | 0.00 | ERR | | 19.36 | 67.07 | 2.28 | | | |
| F | 120.00 | 715.30 | 590.30 | 17.48 | 17.50 | 0.20 | 13.44 | 61.34 | 2.32 | 0.58 | 43.51 | 0.46 | 3.24 |
| S2 | 120.00 | 762.60 | 594.50 | 22.04 | 21.50 | 0.23 | 15.59 | 41.77 | 32.84 | 1.04 | 34.38 | 7.57 | 6.74 |
| S1 | 45.00 | 818.40 | 632.80 | 22.68 | 37.00 | 1.04 | 70.97 | 5.90 | 87.61 | 3.05 | 22.11 | 91.97 | 90.02 |
| | | | | | | 1.46 | 100.00 | 18.94 | 67.61 | 2.40 | 100.00 | 100.00 | 100.00 |

75 Comp Meas Sample : PIF
HI - 2.020 2.026
LO - 1.980 1.960

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 695.40 | 576.20 | 17.14 | 0.00 | ERR | | 23.11 | 60.98 | 2.44 | | | |
| F | 45.00 | 708.90 | 558.50 | 21.22 | 35.60 | 1.02 | 20.83 | 59.63 | 5.27 | 0.33 | 59.90 | 1.68 | 3.50 |
| S2 | 45.00 | 792.10 | 629.60 | 20.52 | 47.00 | 1.36 | 27.74 | 21.57 | 64.25 | 1.60 | 28.86 | 27.33 | 22.61 |
| S1 | 20.00 | 797.80 | 629.80 | 21.06 | 39.00 | 2.51 | 51.44 | 4.53 | 90.01 | 2.82 | 11.24 | 70.99 | 73.89 |
| | | | | | | 4.89 | 100.00 | 20.73 | 65.22 | 1.96 | 100.00 | 100.00 | 100.00 |

FILE : MASSB26

MASS BALANCE CALCULATIONS

76. Comp Meas Sample : PIF
HI - 2.000 2.013
LO - 2.000 1.975

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 863.60 | 735.20 | 14.87 | 0.00 | ERR | | 19.43 | 66.38 | 2.86 | | | |
| F | 30.00 | 761.10 | 612.20 | 19.56 | 44.00 | 1.93 | 37.44 | 53.46 | 14.75 | 0.62 | 89.77 | 8.81 | 11.48 |
| S2 | 30.00 | 699.50 | 565.20 | 19.20 | 30.50 | 1.34 | 26.07 | 5.43 | 89.67 | 1.73 | 6.35 | 37.30 | 22.30 |
| S1 | 30.00 | 826.20 | 647.60 | 21.62 | 44.00 | 1.88 | 36.49 | 2.37 | 92.58 | 3.67 | 3.88 | 53.89 | 66.22 |
| | | | | | | 5.15 | 100.00 | 22.30 | 62.68 | 2.02 | 100.00 | 100.00 | 100.00 |

77. Comp Meas Sample : PIF
HI - 2.000 2.042
LO - 2.000 1.989

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 20.80 | 799.00 | 702.60 | 12.07 | 26.50 | 1.83 | | 22.28 | 62.74 | 1.99 | | | |
| F | 30.00 | 754.30 | 580.60 | 23.03 | 17.00 | 0.71 | 36.63 | 59.58 | 5.21 | 0.47 | 81.13 | 3.42 | 11.36 |
| S2 | 90.00 | 734.70 | 591.80 | 19.45 | 19.00 | 0.28 | 14.28 | 20.62 | 65.86 | 1.50 | 10.95 | 16.82 | 14.13 |
| S1 | 30.00 | 787.70 | 627.90 | 20.29 | 22.00 | 0.95 | 49.09 | 4.34 | 90.83 | 2.30 | 7.92 | 79.76 | 74.50 |
| | | | | | | 1.95 | 100.00 | 26.90 | 55.90 | 1.52 | 100.00 | 100.00 | 100.00 |

78. Comp Meas Sample : PIF
HI - 1.980 2.030
LO - 2.000 1.984

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 806.10 | 718.10 | 10.92 | 0.00 | ERR | | 21.77 | 63.06 | 2.48 | | | |
| F | 45.00 | 657.40 | 533.00 | 18.92 | 17.50 | 0.52 | 28.69 | 59.67 | 5.02 | 0.32 | 74.20 | 2.34 | 7.47 |
| S2 | 60.00 | 801.40 | 631.00 | 21.26 | 15.00 | 0.32 | 17.91 | 18.95 | 68.51 | 1.49 | 14.71 | 19.96 | 13.37 |
| S1 | 45.00 | 957.20 | 743.50 | 22.33 | 34.00 | 0.96 | 53.40 | 4.79 | 89.46 | 2.96 | 11.09 | 77.70 | 79.16 |
| | | | | | | 1.80 | 100.00 | 23.07 | 61.48 | 2.00 | 100.00 | 100.00 | 100.00 |

FILE : MASSB27

MASS BALANCE CALCULATIONS

79. Comp Meas Sample : PIF
HI - 1.960 2.010
LO - 2.000 1.992

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 804.10 | 720.20 | 10.43 | 0.00 | ERR | | 22.88 | 60.91 | 2.87 | | | |
| F | 60.00 | 733.50 | 596.30 | 18.70 | 20.00 | 0.44 | 24.33 | 60.34 | 4.03 | 0.45 | 69.21 | 1.52 | 5.60 |
| S2 | 90.00 | 728.00 | 572.00 | 21.43 | 14.50 | 0.21 | 11.36 | 20.63 | 65.63 | 1.71 | 11.05 | 11.57 | 9.93 |
| S1 | 45.00 | 959.90 | 754.70 | 21.38 | 41.00 | 1.17 | 64.31 | 6.51 | 87.12 | 2.57 | 19.74 | 86.91 | 84.47 |
| | | | | | | 1.82 | 100.00 | 21.21 | 64.47 | 1.96 | 100.00 | 100.00 | 100.00 |

80. Comp Meas Sample : PIF
HI - 1.960 2.023
LO - 2.000 1.993

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 805.40 | 701.00 | 12.96 | 0.00 | ERR | | 22.08 | 62.65 | 2.40 | | | |
| F | 60.00 | 770.90 | 632.00 | 18.02 | 20.00 | 0.45 | 21.78 | 60.21 | 4.19 | 0.50 | 68.31 | 1.35 | 5.36 |
| S2 | 90.00 | 813.90 | 641.70 | 21.16 | 18.00 | 0.26 | 12.57 | 19.36 | 67.74 | 1.61 | 12.67 | 12.60 | 9.96 |
| S1 | 30.00 | 998.60 | 783.40 | 21.55 | 31.50 | 1.35 | 65.65 | 5.56 | 88.58 | 2.62 | 19.01 | 86.05 | 84.68 |
| | | | | | | 2.05 | 100.00 | 19.20 | 67.58 | 2.03 | 100.00 | 100.00 | 100.00 |

81. Comp Meas Sample : PIF
HI - 1.950 2.021
LO - 2.000 1.986

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 19.20 | 751.70 | 646.60 | 13.98 | 33.00 | 2.41 | | 23.31 | 60.85 | 2.25 | | | |
| F | 30.00 | 672.40 | 542.20 | 19.36 | 33.50 | 1.47 | 49.90 | 49.68 | 20.65 | 0.71 | 93.41 | 18.26 | 22.79 |
| S2 | 30.00 | 792.30 | 638.30 | 19.44 | 17.00 | 0.75 | 25.30 | 5.19 | 90.27 | 1.51 | 4.95 | 40.47 | 24.57 |
| S1 | 30.00 | 843.90 | 666.50 | 21.02 | 17.00 | 0.73 | 24.80 | 1.76 | 93.91 | 3.30 | 1.64 | 41.27 | 52.64 |
| | | | | | | 2.95 | 100.00 | 26.54 | 56.43 | 1.55 | 100.00 | 100.00 | 100.00 |

FILE : MASSB28

MASS BALANCE CALCULATIONS

B2. Comp Meas Sample : PIF
HI - 2.010 2.036
LO - 2.000 1.973

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 630.60 | 542.10 | 14.03 | 0.00 | ERR | | 22.47 | 62.21 | 2.22 | | | |
| F | 60.00 | 781.50 | 631.20 | 19.23 | 20.50 | 0.45 | 12.07 | 60.90 | 3.33 | 0.26 | 36.53 | 0.61 | 1.81 |
| S2 | 60.00 | 783.80 | 628.20 | 19.85 | 41.00 | 0.89 | 23.95 | 35.39 | 42.96 | 1.02 | 42.13 | 15.49 | 14.09 |
| S1 | 20.00 | 1008.70 | 808.60 | 19.84 | 36.50 | 2.39 | 63.98 | 6.71 | 87.10 | 2.28 | 21.34 | 83.90 | 84.11 |
| | | | | | | 3.73 | 100.00 | 20.12 | 66.42 | 1.73 | 100.00 | 100.00 | 100.00 |

B3. Comp Meas Sample : PIF
HI - 2.000 2.024
LO - 2.000 1.958

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 14.60 | 640.80 | 545.30 | 14.90 | 30.50 | 2.90 | | 20.14 | 65.43 | 2.69 | | | |
| F | 60.00 | 706.10 | 567.30 | 19.66 | 17.00 | 0.37 | 11.62 | 61.44 | 2.52 | 0.22 | 36.12 | 0.44 | 1.23 |
| S2 | 30.00 | 784.50 | 625.60 | 20.25 | 16.00 | 0.69 | 21.71 | 36.35 | 41.18 | 1.28 | 39.93 | 13.42 | 13.42 |
| S1 | 30.00 | 866.60 | 714.80 | 17.52 | 47.50 | 2.13 | 66.67 | 7.10 | 86.11 | 2.65 | 23.95 | 86.15 | 85.34 |
| | | | | | | 3.20 | 100.00 | 19.77 | 66.64 | 2.07 | 100.00 | 100.00 | 100.00 |

B4. Comp Meas Sample : PIF
HI - 1.980 2.045
LO - 2.000 1.976

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 847.60 | 741.60 | 12.51 | 0.00 | ERR | | 22.02 | 62.26 | 2.88 | | | |
| F | 30.00 | 790.90 | 645.60 | 18.37 | 25.50 | 1.13 | 33.63 | 57.39 | 8.56 | 0.59 | 87.93 | 4.56 | 9.11 |
| S2 | 30.00 | 799.50 | 639.30 | 20.04 | 19.00 | 0.83 | 24.55 | 7.10 | 87.17 | 1.59 | 7.94 | 33.92 | 17.92 |
| S1 | 30.00 | 994.40 | 780.10 | 21.55 | 33.00 | 1.41 | 41.83 | 2.17 | 92.76 | 3.80 | 4.13 | 61.51 | 72.97 |
| | | | | | | 3.37 | 100.00 | 21.95 | 63.07 | 2.18 | 100.00 | 100.00 | 100.00 |

FILE : MASSB29

MASS BALANCE CALCULATIONS

85. Comp Meas Sample : PIF
HI - 1.960 2.040
LO - 2.000 1.996

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 883.60 | 776.50 | 12.12 | 0.00 | ERR | | 22.02 | 61.85 | 3.29 | | | |
| F | 30.00 | 764.00 | 622.90 | 18.47 | 32.50 | 1.44 | 34.63 | 55.67 | 11.33 | 0.54 | 87.66 | 6.26 | 7.40 |
| S2 | 30.00 | 784.60 | 631.60 | 19.50 | 27.00 | 1.18 | 28.41 | 7.04 | 87.14 | 1.72 | 9.09 | 39.51 | 19.34 |
| S1 | 30.00 | 905.00 | 731.10 | 19.22 | 35.00 | 1.54 | 36.96 | 1.93 | 91.93 | 5.01 | 3.24 | 54.23 | 73.26 |
| | | | | | | 4.17 | 100.00 | 21.99 | 62.66 | 2.53 | 100.00 | 100.00 | 100.00 |

86. Comp Meas Sample : PIF
HI - 1.970 2.016
LO - 2.000 1.966

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.84 | 632.70 | 538.30 | 14.92 | 31.20 | 3.66 | | 23.10 | 60.99 | 2.44 | | | |
| F | 90.00 | 801.50 | 641.40 | 19.98 | 25.50 | 0.37 | 12.20 | 61.34 | 2.69 | 0.21 | 36.43 | 0.50 | 1.24 |
| S2 | 60.00 | 794.50 | 638.10 | 19.69 | 28.00 | 0.61 | 20.17 | 33.96 | 45.04 | 1.20 | 33.34 | 13.89 | 11.75 |
| S1 | 30.00 | 722.70 | 577.10 | 20.15 | 47.20 | 2.05 | 67.62 | 9.19 | 82.80 | 2.65 | 30.24 | 85.61 | 87.00 |
| | | | | | | 3.03 | 100.00 | 20.55 | 65.41 | 2.06 | 100.00 | 100.00 | 100.00 |

87. Comp Meas Sample : PIF
HI - 1.990 2.048
LO - 2.020 1.999

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 880.50 | 742.10 | 15.72 | 0.00 | ERR | | 23.43 | 60.82 | 2.09 | | | |
| F | 30.00 | 875.50 | 706.40 | 19.31 | 33.50 | 1.47 | 32.56 | 58.79 | 6.55 | 0.38 | 77.60 | 3.58 | 9.12 |
| S2 | 45.00 | 768.90 | 608.40 | 20.87 | 31.00 | 0.89 | 19.70 | 14.69 | 75.46 | 1.29 | 11.73 | 24.94 | 18.73 |
| S1 | 20.00 | 928.70 | 734.60 | 20.90 | 33.40 | 2.16 | 47.74 | 5.51 | 89.23 | 2.05 | 10.66 | 71.48 | 72.15 |
| | | | | | | 4.52 | 100.00 | 24.67 | 59.59 | 1.36 | 100.00 | 100.00 | 100.00 |

FILE : MASSB30

MASS BALANCE CALCULATIONS

88. Comp Meas Sample : PIF
HI - 1.990 2.034
LO - 2.010 1.982

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 701.30 | 604.50 | 13.80 | 0.00 | ERR | | 22.98 | 61.52 | 2.10 | | | |
| F | 60.00 | 853.90 | 689.80 | 19.22 | 27.50 | 0.60 | 22.02 | 60.01 | 4.66 | 0.34 | 62.42 | 1.58 | 4.70 |
| S2 | 90.00 | 698.00 | 553.50 | 20.70 | 30.50 | 0.44 | 15.98 | 21.30 | 65.05 | 1.23 | 16.08 | 16.02 | 12.35 |
| S1 | 30.00 | 832.10 | 676.00 | 18.76 | 38.50 | 1.70 | 62.00 | 7.34 | 86.25 | 2.13 | 21.50 | 82.40 | 82.95 |
| | | | | | | 2.75 | 100.00 | 21.17 | 64.90 | 1.59 | 100.00 | 100.00 | 100.00 |

89. Comp Meas Sample : PIF
HI - 2.000 2.044
LO - 2.010 1.998

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.33 | 753.60 | 658.00 | 12.69 | 31.50 | 3.97 | | 22.61 | 62.25 | 1.96 | | | |
| F | 30.00 | 844.60 | 685.20 | 18.87 | 26.20 | 1.16 | 33.50 | 57.26 | 8.91 | 0.45 | 81.93 | 4.87 | 9.27 |
| S2 | 60.00 | 768.60 | 617.80 | 19.62 | 31.50 | 0.69 | 19.95 | 11.76 | 80.17 | 1.21 | 10.02 | 26.09 | 14.85 |
| S1 | 30.00 | 802.10 | 640.40 | 20.16 | 37.00 | 1.61 | 46.55 | 4.05 | 90.94 | 2.65 | 8.05 | 69.05 | 75.88 |
| | | | | | | 3.45 | 100.00 | 23.41 | 61.31 | 1.63 | 100.00 | 100.00 | 100.00 |

90. Comp Meas Sample : PIF
HI - 2.000 2.039
LO - 2.000 1.975

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 736.90 | 634.20 | 13.94 | 0.00 | ERR | | 22.54 | 62.25 | 2.07 | | | |
| F | 30.00 | 759.80 | 643.90 | 15.25 | 25.50 | 1.18 | 29.64 | 59.06 | 6.13 | 0.38 | 74.44 | 2.96 | 8.12 |
| S2 | 60.00 | 789.40 | 633.50 | 19.50 | 38.40 | 0.84 | 21.20 | 18.08 | 70.15 | 1.23 | 16.30 | 24.22 | 18.81 |
| S1 | 20.00 | 808.40 | 644.00 | 20.34 | 30.00 | 1.95 | 49.16 | 4.43 | 90.93 | 2.06 | 9.26 | 72.82 | 73.06 |
| | | | | | | 3.97 | 100.00 | 23.51 | 61.39 | 1.39 | 100.00 | 100.00 | 100.00 |

FILE : MASSB31

MASS BALANCE CALCULATIONS

91. Comp Meas Sample : PIF
HI - 2.000 2.041
LO - 2.005 1.998

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 773.10 | 659.80 | 14.66 | 0.00 | ERR | | 23.09 | 61.12 | 2.33 | | | |
| F | 30.00 | 697.60 | 567.70 | 18.62 | 40.80 | 1.81 | 31.98 | 55.06 | 12.28 | 0.56 | 79.78 | 6.17 | 12.07 |
| S2 | 30.00 | 888.60 | 716.80 | 19.33 | 32.20 | 1.41 | 25.01 | 10.51 | 82.03 | 1.33 | 11.91 | 32.27 | 22.42 |
| S1 | 20.00 | 689.10 | 565.20 | 17.98 | 36.30 | 2.43 | 43.01 | 4.26 | 91.00 | 2.26 | 8.30 | 61.55 | 65.51 |
| | | | | | | 5.65 | 100.00 | 22.07 | 63.58 | 1.48 | 100.00 | 100.00 | 100.00 |

92. Comp Meas Sample : PIF
HI - 2.000 2.049
LO - 2.005 1.993

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 738.80 | 638.60 | 13.56 | 0.00 | ERR | | 22.61 | 62.25 | 1.96 | | | |
| F | 30.00 | 750.80 | 608.30 | 18.98 | 27.00 | 1.19 | 32.98 | 57.26 | 8.91 | 0.45 | 81.02 | 4.78 | 9.25 |
| S2 | 60.00 | 771.50 | 621.50 | 19.44 | 36.50 | 0.80 | 22.17 | 11.76 | 80.17 | 1.21 | 11.18 | 28.90 | 16.71 |
| S1 | 30.00 | 838.40 | 670.50 | 20.03 | 37.20 | 1.62 | 44.85 | 4.05 | 90.94 | 2.65 | 7.79 | 66.33 | 74.05 |
| | | | | | | 3.61 | 100.00 | 23.31 | 61.50 | 1.61 | 100.00 | 100.00 | 100.00 |

93. Comp Meas Sample : PIF
HI - 2.000 2.052
LO - 2.005 1.998

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 30.00 | 605.60 | 538.80 | 11.03 | 36.00 | 1.74 | | 21.27 | 63.23 | 3.10 | | | |
| F | 60.00 | 706.00 | 570.40 | 19.21 | 41.40 | 0.91 | 38.19 | 54.55 | 12.93 | 0.72 | 89.58 | 8.10 | 12.27 |
| S2 | 60.00 | 708.90 | 567.80 | 19.90 | 22.00 | 0.48 | 20.12 | 6.92 | 87.26 | 1.79 | 5.99 | 28.80 | 16.08 |
| S1 | 30.00 | 768.80 | 610.30 | 20.62 | 23.00 | 0.99 | 41.69 | 2.47 | 92.24 | 3.85 | 4.43 | 63.10 | 71.65 |
| | | | | | | 2.38 | 100.00 | 23.25 | 60.95 | 2.24 | 100.00 | 100.00 | 100.00 |

FILE : MASSB32

MASS BALANCE CALCULATIONS

94. Comp Meas Sample : PIF
HI - 1.990 2.042
LO - 2.005 1.995

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 723.30 | 630.60 | 12.82 | 0.00 | ERR | | 21.56 | 62.77 | 3.10 | | | |
| F | 60.00 | 757.60 | 617.10 | 18.55 | 28.50 | 0.63 | 24.37 | 58.22 | 7.25 | 0.59 | 78.56 | 2.57 | 5.56 |
| S2 | 60.00 | 807.10 | 643.10 | 20.32 | 23.50 | 0.51 | 19.66 | 10.73 | 81.20 | 1.81 | 11.68 | 23.19 | 13.75 |
| S1 | 30.00 | 779.10 | 625.60 | 19.70 | 33.20 | 1.45 | 55.97 | 3.15 | 91.28 | 3.73 | 9.76 | 74.24 | 80.69 |
| | | | | | | 2.59 | 100.00 | 18.06 | 68.82 | 2.59 | 100.00 | 100.00 | 100.00 |

95. Comp Meas Sample : PIF
HI - 2.010 ?
LO - 1.995 ?

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 727.70 | 633.80 | 12.90 | 0.00 | ERR | | 19.17 | 64.91 | 4.74 | | | |
| F | 30.00 | 728.40 | 582.70 | 20.00 | 20.50 | 0.89 | 21.61 | 58.73 | 6.54 | 0.49 | 67.04 | 2.14 | 2.73 |
| S2 | 30.00 | 767.50 | 615.30 | 19.83 | 31.00 | 1.35 | 32.75 | 15.18 | 73.30 | 2.67 | 26.26 | 36.29 | 22.57 |
| S1 | 30.00 | 1095.10 | 871.80 | 20.39 | 43.50 | 1.89 | 45.64 | 2.78 | 89.26 | 6.34 | 6.70 | 61.58 | 74.69 |
| | | | | | | 4.13 | 100.00 | 18.93 | 66.15 | 3.87 | 100.00 | 100.00 | 100.00 |

96. Comp Meas Sample : PIF
HI - 1.990 2.048
LO - 1.995 1.978

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K20 | ASSAY NACL | ASSAY NI | RECOVERY K20 | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 15.40 | 727.70 | 577.90 | 20.59 | 32.00 | 2.70 | | 19.25 | 65.55 | 3.98 | | | |
| F | 90.00 | 728.40 | 493.30 | 32.28 | 14.00 | 0.17 | 10.44 | 59.95 | 4.65 | 0.45 | 43.65 | 0.66 | 1.24 |
| S2 | 90.00 | 767.50 | 602.10 | 21.55 | 20.00 | 0.28 | 17.27 | 24.53 | 59.08 | 2.09 | 29.56 | 13.88 | 9.52 |
| S1 | 30.00 | 1095.10 | 695.00 | 36.54 | 34.50 | 1.19 | 72.30 | 5.31 | 86.91 | 4.68 | 26.79 | 85.46 | 89.24 |
| | | | | | | 1.65 | 100.00 | 14.33 | 73.52 | 3.79 | 100.00 | 100.00 | 100.00 |

FILE : MASSB33

MASS BALANCE CALCULATIONS

97. Comp Meas Sample : PIF
HI - 1.990 2.029
LO - 1.995 1.963

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 601.80 | 548.80 | 8.81 | 0.00 | ERR | | 15.79 | 70.33 | 4.67 | | | |
| F | 45.00 | 669.80 | 537.70 | 19.72 | 21.00 | 0.61 | 55.19 | 58.95 | 6.16 | 0.52 | 89.87 | 8.43 | 12.24 |
| S2 | 90.00 | 899.80 | 716.20 | 20.40 | 14.50 | 0.21 | 18.89 | 14.40 | 74.24 | 2.96 | 7.51 | 34.76 | 23.65 |
| S1 | 90.00 | 912.20 | 740.70 | 18.80 | 19.50 | 0.29 | 25.92 | 3.65 | 88.44 | 5.78 | 2.61 | 56.81 | 63.90 |
| | | | | | | 1.11 | 100.00 | 36.20 | 40.35 | 2.34 | 100.00 | 100.00 | 100.00 |

98. Comp Meas Sample : PIF
HI - 1.990 2.028
LO - 1.995 1.997

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.00 | 544.20 | 459.50 | 15.56 | 34.00 | 4.69 | | 19.26 | 65.40 | 4.11 | | | |
| F | 30.00 | 747.70 | 602.80 | 19.38 | 27.00 | 1.19 | 25.26 | 58.53 | 6.77 | 0.58 | 76.76 | 2.59 | 4.27 |
| S2 | 30.00 | 869.90 | 697.30 | 19.84 | 22.50 | 0.98 | 20.93 | 11.08 | 79.54 | 2.92 | 12.04 | 25.20 | 17.81 |
| S1 | 20.00 | 823.10 | 660.70 | 19.73 | 38.50 | 2.52 | 53.80 | 4.01 | 88.68 | 4.97 | 11.20 | 72.21 | 77.92 |
| | | | | | | 4.69 | 100.00 | 19.26 | 66.07 | 3.43 | 100.00 | 100.00 | 100.00 |

99. Comp Meas Sample : PIF
HI - 2.000 2.044
LO - 1.995 1.985

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 711.40 | 599.60 | 15.72 | 0.00 | ERR | | 19.76 | 64.16 | 4.56 | | | |
| F | 30.00 | 810.40 | 656.70 | 18.97 | 29.50 | 1.30 | 37.70 | 49.33 | 20.99 | 0.89 | 91.72 | 12.29 | 9.53 |
| S2 | 30.00 | 779.50 | 640.50 | 17.83 | 24.00 | 1.07 | 31.10 | 3.44 | 92.01 | 2.54 | 5.27 | 44.45 | 22.43 |
| S1 | 30.00 | 875.50 | 679.50 | 22.39 | 25.50 | 1.08 | 31.21 | 1.95 | 89.23 | 7.68 | 3.00 | 43.26 | 68.05 |
| | | | | | | 3.45 | 100.00 | 20.28 | 64.37 | 3.52 | 100.00 | 100.00 | 100.00 |

FILE : MASSB34

MASS BALANCE CALCULATIONS

100. Comp Meas Sample : PIF
HI - 2.000 2.028
LO - 1.995 1.986

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 625.70 | 579.60 | 7.37 | 0.00 | ERR | | 17.51 | 67.62 | 4.66 | | | |
| F | 90.00 | 704.50 | 579.20 | 17.79 | 17.00 | 0.25 | 22.80 | 57.68 | 7.86 | 0.83 | 82.07 | 2.54 | 4.59 |
| S2 | 90.00 | 711.20 | 560.30 | 21.22 | 8.00 | 0.11 | 10.28 | 6.74 | 86.59 | 2.74 | 4.32 | 12.63 | 6.83 |
| S1 | 45.00 | 867.70 | 671.40 | 22.62 | 26.50 | 0.74 | 66.91 | 3.26 | 89.38 | 5.46 | 13.61 | 84.83 | 88.58 |
| | | | | | | 1.11 | 100.00 | 16.03 | 70.50 | 4.12 | 100.00 | 100.00 | 100.00 |

101. Comp Meas Sample : PIF
HI - 2.000 2.030
LO - 1.995 1.993

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.60 | 696.50 | 604.30 | 13.24 | 34.50 | 3.88 | | 19.71 | 64.87 | 3.93 | | | |
| F | 30.00 | 756.10 | 614.50 | 18.73 | 24.50 | 1.08 | 28.41 | 56.76 | 9.43 | 0.72 | 82.43 | 4.05 | 6.95 |
| S2 | 45.00 | 928.80 | 737.30 | 20.62 | 22.50 | 0.65 | 16.99 | 9.27 | 83.04 | 2.29 | 8.05 | 21.34 | 13.22 |
| S1 | 20.00 | 845.70 | 674.40 | 20.26 | 32.00 | 2.08 | 54.61 | 3.41 | 90.30 | 4.30 | 9.52 | 74.61 | 79.82 |
| | | | | | | 3.82 | 100.00 | 19.56 | 66.09 | 2.94 | 100.00 | 100.00 | 100.00 |

102 Comp Meas Sample : PIF
HI - 2.000 2.030
LO - 1.990 1.979

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 616.20 | 538.50 | 12.61 | 0.00 | ERR | | 19.76 | 64.16 | 4.56 | | | |
| F | 60.00 | 778.30 | 637.70 | 18.07 | 32.00 | 0.71 | 17.69 | 49.35 | 20.99 | 0.89 | 81.74 | 4.77 | 2.98 |
| S2 | 60.00 | 815.50 | 654.30 | 19.77 | 42.80 | 0.93 | 23.16 | 3.44 | 92.01 | 2.54 | 7.46 | 27.39 | 11.13 |
| S1 | 20.00 | 787.90 | 629.20 | 20.14 | 36.60 | 2.39 | 59.15 | 1.95 | 89.23 | 7.68 | 10.80 | 67.83 | 85.90 |
| | | | | | | 4.04 | 100.00 | 10.68 | 77.81 | 5.29 | 100.00 | 100.00 | 100.00 |

FILE : MASSB33

MASS BALANCE CALCULATIONS

103. Comp Meas Sample : PIF
HI - 2.000 1.974
LO - 1.990 1.986

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.18 | 804.70 | 684.50 | 14.94 | 34.80 | 4.75 | | 22.93 | 61.14 | 2.56 | | | |
| F | 45.00 | 797.00 | 651.30 | 18.28 | 35.80 | 1.06 | 27.46 | 56.83 | 9.31 | 0.73 | 74.72 | 3.92 | 11.18 |
| S2 | 60.00 | 695.40 | 551.00 | 20.77 | 39.60 | 0.85 | 22.09 | 3.88 | 90.65 | 3.21 | 4.10 | 30.74 | 39.56 |
| S1 | 30.00 | 838.50 | 678.10 | 19.13 | 44.30 | 1.95 | 50.45 | 8.77 | 84.37 | 1.75 | 21.18 | 65.34 | 49.25 |
| | | | | | | 3.87 | 100.00 | 20.89 | 65.14 | 1.79 | 100.00 | 100.00 | 100.00 |

104. Comp Meas Sample : PIF
HI - 2.000 2.047
LO - 1.990 1.989

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 778.50 | 665.10 | 14.57 | 0.00 | ERR | | 23.13 | 60.60 | 2.78 | | | |
| F | 30.00 | 741.00 | 603.10 | 18.61 | 39.00 | 1.73 | 35.50 | 53.03 | 15.14 | 0.91 | 87.18 | 8.42 | 16.05 |
| S2 | 30.00 | 705.40 | 570.90 | 19.07 | 28.00 | 1.23 | 25.34 | 6.18 | 88.45 | 1.77 | 7.25 | 35.13 | 22.28 |
| S1 | 20.00 | 800.10 | 644.10 | 19.50 | 29.00 | 1.91 | 39.16 | 3.07 | 91.97 | 3.17 | 5.57 | 56.45 | 61.67 |
| | | | | | | 4.87 | 100.00 | 21.59 | 63.81 | 2.01 | 100.00 | 100.00 | 100.00 |

105. Comp Meas Sample : PIF
HI - 2.000 2.050
LO - 1.990 2.009

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 804.70 | 685.50 | 14.81 | 0.00 | ERR | | 20.42 | 63.61 | 4.06 | | | |
| F | 25.30 | 760.70 | 618.30 | 18.72 | 41.70 | 2.19 | 43.12 | 45.20 | 27.52 | 0.93 | 91.97 | 18.60 | 15.02 |
| S2 | 30.30 | 820.70 | 664.40 | 19.04 | 45.00 | 1.96 | 38.70 | 3.43 | 92.33 | 2.24 | 6.26 | 56.02 | 32.47 |
| S1 | 45.20 | 864.20 | 658.50 | 23.80 | 33.50 | 0.92 | 18.18 | 2.06 | 89.03 | 7.71 | 1.77 | 25.37 | 52.50 |
| | | | | | | 5.07 | 100.00 | 21.19 | 63.78 | 2.67 | 100.00 | 100.00 | 100.00 |

FILE : MASSB36

MASS BALANCE CALCULATIONS

106.  Comp  Meas  Sample : PIF
HI -  2.000  2.029
LO -  1.990  1.978

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 813.00 | 704.10 | 13.39 | 0.00 | ERR | | 20.95 | 63.24 | 3.60 | | | |
| F | 30.00 | 813.10 | 658.70 | 18.99 | 30.50 | 1.35 | 31.14 | 56.27 | 10.18 | 0.74 | 84.36 | 4.97 | 6.88 |
| S2 | 45.00 | 801.50 | 640.10 | 20.14 | 34.20 | 0.99 | 22.95 | 8.62 | 84.15 | 2.20 | 9.35 | 30.25 | 15.08 |
| S1 | 20.00 | 806.90 | 642.40 | 20.39 | 30.50 | 1.98 | 45.91 | 2.66 | 90.10 | 5.69 | 5.89 | 64.78 | 78.03 |
| | | | | | | 4.32 | 100.00 | 20.72 | 63.85 | 3.35 | 100.00 | 100.00 | 100.00 |

107.  Comp  Meas  Sample : PIF
HI -  2.000  2.038
LO -  1.990  1.982

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 9.14 | 641.50 | 542.30 | 15.46 | 30.50 | 4.61 | | 21.79 | 62.06 | 3.45 | | | |
| F | 45.00 | 839.60 | 674.90 | 19.62 | 43.00 | 1.25 | 27.62 | 56.48 | 9.78 | 0.81 | 81.90 | 4.04 | 7.32 |
| S2 | 45.00 | 795.40 | 629.20 | 20.90 | 35.00 | 1.00 | 22.12 | 9.17 | 83.61 | 1.87 | 10.65 | 27.69 | 13.54 |
| S1 | 20.00 | 723.40 | 571.40 | 21.01 | 35.40 | 2.28 | 50.26 | 2.82 | 90.73 | 4.81 | 7.44 | 68.27 | 79.14 |
| | | | | | | 4.54 | 100.00 | 19.04 | 66.80 | 3.06 | 100.00 | 100.00 | 100.00 |

108.  Comp  Meas  Sample : PIF
HI -  2.000  2.040
LO -  1.990  2.008

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 740.60 | 638.70 | 13.76 | 0.00 | ERR | | 20.56 | 63.98 | 3.47 | | | |
| F | 30.00 | 850.10 | 683.50 | 19.60 | 33.00 | 1.44 | 30.22 | 56.01 | 10.64 | 0.69 | 83.71 | 4.92 | 7.96 |
| S2 | 45.00 | 740.50 | 588.50 | 20.53 | 41.00 | 1.18 | 24.74 | 8.18 | 85.22 | 1.83 | 10.01 | 32.25 | 17.28 |
| S1 | 20.00 | 791.50 | 652.20 | 17.60 | 32.00 | 2.15 | 45.04 | 2.82 | 91.19 | 4.35 | 6.28 | 62.83 | 74.77 |
| | | | | | | 4.78 | 100.00 | 20.22 | 65.37 | 2.62 | 100.00 | 100.00 | 100.00 |

FILE : MASSB37

MASS BALANCE CALCULATIONS

109 Comp Meas Sample : PIF
HI - 1.995 2.032
LO - 1.980 1.982

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 821.80 | 713.40 | 13.19 | 0.00 | ERR | | 22.77 | 60.94 | 3.01 | | | |
| F | 20.00 | 866.70 | 690.00 | 20.39 | 30.50 | 1.98 | 36.25 | 50.95 | 18.58 | 0.76 | 87.83 | 10.51 | 10.63 |
| S2 | 30.00 | 708.50 | 575.50 | 18.77 | 34.20 | 1.51 | 27.65 | 6.06 | 88.21 | 2.20 | 7.97 | 38.04 | 23.47 |
| S1 | 20.00 | 768.50 | 609.30 | 20.72 | 30.50 | 1.97 | 36.10 | 2.45 | 91.39 | 4.73 | 4.21 | 51.46 | 65.90 |
| | | | | | | 5.47 | 100.00 | 21.03 | 64.12 | 2.59 | 100.00 | 100.00 | 100.00 |

110. Comp Meas Sample : PIF
HI - 1.995 2.025
LO - 1.980 1.960

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.60 | 750.70 | 636.00 | 15.28 | 31.50 | 4.11 | | 22.65 | 62.25 | 1.89 | | | |
| F | 45.00 | 805.30 | 650.80 | 19.19 | 36.50 | 1.07 | 26.67 | 58.97 | 6.12 | 0.53 | 74.26 | 2.51 | 9.78 |
| S2 | 45.00 | 833.00 | 663.30 | 20.35 | 32.00 | 0.93 | 23.05 | 16.83 | 72.13 | 1.23 | 18.31 | 25.56 | 19.61 |
| S1 | 20.00 | 949.00 | 769.10 | 18.96 | 30.50 | 2.02 | 50.28 | 3.13 | 93.02 | 2.03 | 7.43 | 71.93 | 70.61 |
| | | | | | | 4.01 | 100.00 | 21.18 | 65.03 | 1.45 | 100.00 | 100.00 | 100.00 |

111. Comp Meas Sample : PIF
HI - 1.995 2.020
LO - 1.980 1.948

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 759.40 | 640.70 | 15.63 | 0.00 | ERR | | 22.88 | 62.15 | 1.63 | | | |
| F | 45.00 | 780.30 | 630.30 | 19.22 | 36.20 | 1.06 | 29.01 | 58.26 | 7.28 | 0.49 | 75.69 | 3.34 | 10.97 |
| S2 | 45.00 | 844.40 | 683.60 | 19.04 | 30.80 | 0.91 | 24.74 | 15.10 | 74.93 | 1.17 | 16.73 | 29.26 | 22.33 |
| S1 | 20.00 | 851.00 | 678.10 | 20.32 | 26.00 | 1.69 | 46.25 | 3.66 | 92.34 | 1.87 | 7.58 | 67.41 | 66.71 |
| | | | | | | 3.66 | 100.00 | 22.33 | 63.35 | 1.30 | 100.00 | 100.00 | 100.00 |

FILE : MASSB38

MASS BALANCE CALCULATIONS

112. Comp Meas Sample : SIT
HI - 2.000 2.023
LO - 1.990 1.961

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 740.00 | 626.50 | 15.34 | 0.00 | ERR | | 21.74 | 64.07 | 1.51 | | | |
| F | 30.00 | 871.10 | 705.60 | 19.00 | 25.80 | 1.14 | 28.66 | 58.31 | 6.92 | 0.46 | 77.18 | 3.08 | 10.49 |
| S2 | 60.00 | 845.70 | 686.70 | 18.80 | 37.80 | 0.84 | 21.05 | 14.93 | 75.23 | 1.14 | 14.46 | 24.61 | 19.09 |
| S1 | 20.00 | 863.50 | 692.10 | 19.85 | 30.50 | 2.00 | 50.29 | 3.61 | 92.53 | 1.76 | 8.36 | 72.31 | 70.42 |
| | | | | | | 3.97 | 100.00 | 21.73 | 64.35 | 1.26 | 100.00 | 100.00 | 100.00 |

113. Comp Meas Sample : SIT
HI - 2.000 2.019
LO - 1.990 1.972

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 846.90 | 714.40 | 15.65 | 0.00 | ERR | | 21.16 | 65.04 | 1.46 | | | |
| F | 30.00 | 802.40 | 647.40 | 19.32 | 26.50 | 1.16 | 29.77 | 55.66 | 11.36 | 0.53 | 81.81 | 5.08 | 12.03 |
| S2 | 30.00 | 807.30 | 651.40 | 19.31 | 20.00 | 0.88 | 22.47 | 11.00 | 81.45 | 1.14 | 12.20 | 27.47 | 19.53 |
| S1 | 30.00 | 1034.60 | 835.10 | 19.28 | 42.50 | 1.87 | 47.76 | 2.54 | 94.10 | 1.88 | 5.99 | 67.46 | 68.45 |
| | | | | | | 3.91 | 100.00 | 20.25 | 66.63 | 1.31 | 100.00 | 100.00 | 100.00 |

114. Comp Meas Sample : SIT
HI - 2.000 2.048
LO - 1.985 1.969

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/H (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 10.60 | 650.50 | 548.70 | 15.65 | 33.50 | 4.35 | | 16.34 | 72.81 | 1.32 | | | |
| F | 30.00 | 747.80 | 601.10 | 19.62 | 20.00 | 0.88 | 19.76 | 60.26 | 4.33 | 0.28 | 55.87 | 1.32 | 4.50 |
| S2 | 30.00 | 766.40 | 614.50 | 19.82 | 27.00 | 1.18 | 26.62 | 28.26 | 54.31 | 0.95 | 35.28 | 22.23 | 20.53 |
| S1 | 20.00 | 914.60 | 749.10 | 18.10 | 35.50 | 2.37 | 53.62 | 3.52 | 92.71 | 1.72 | 8.85 | 76.45 | 74.95 |
| | | | | | | 4.43 | 100.00 | 21.32 | 65.02 | 1.23 | 100.00 | 100.00 | 100.00 |

FILE : MASSB39

MASS BALANCE CALCULATIONS

115. Comp Meas Sample : SIT
HI - 2.000 2.044
LO - 1.985 1.967

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 688.90 | 573.70 | 16.72 | 0.00 | ERR | | 21.17 | 65.09 | 1.40 | | | |
| F | 30.00 | 750.00 | 602.10 | 19.72 | 17.50 | 0.76 | 18.85 | 60.75 | 3.58 | 0.25 | 57.28 | 1.01 | 3.89 |
| S2 | 30.00 | 807.60 | 646.10 | 20.00 | 19.50 | 0.85 | 20.93 | 26.65 | 36.80 | 1.01 | 27.90 | 17.71 | 17.47 |
| S1 | 20.00 | 918.60 | 763.60 | 16.87 | 36.00 | 2.44 | 60.22 | 4.92 | 90.63 | 1.58 | 14.82 | 81.29 | 78.64 |
| | | | | | | 4.06 | 100.00 | 19.99 | 67.14 | 1.21 | 100.00 | 100.00 | 100.00 |

116. Comp Meas Sample : SIT
HI - 1.990 2.001
LO - 1.986 -

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 885.40 | 744.40 | 15.93 | 0.00 | ERR | | 21.99 | 63.49 | 1.70 | | | |
| F | 30.00 | 722.10 | 582.90 | 19.28 | 17.50 | 0.77 | 18.78 | 60.49 | 3.95 | 0.29 | 54.03 | 1.13 | 4.40 |
| S2 | 30.00 | 845.70 | 679.60 | 19.64 | 21.00 | 0.92 | 22.43 | 29.92 | 51.64 | 1.00 | 31.93 | 17.69 | 18.13 |
| S1 | 20.00 | 833.20 | 673.10 | 19.22 | 36.50 | 2.41 | 58.79 | 5.02 | 90.42 | 1.63 | 14.04 | 81.18 | 77.47 |
| | | | | | | 4.10 | 100.00 | 21.02 | 65.49 | 1.24 | 100.00 | 100.00 | 100.00 |

117. Comp Meas Sample : SIT
HI - 1.990 2.023
LO - 1.980 1.963

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K20 | ASSAY NACL | ASSAY MI | RECOVERY K20 | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.50 | 704.90 | 604.70 | 14.21 | 34.00 | 4.14 | | 20.65 | 65.84 | 1.47 | | | |
| F | 30.00 | 826.80 | 667.90 | 19.22 | 20.50 | 0.90 | 21.07 | 59.97 | 4.70 | 0.37 | 61.39 | 1.30 | 6.14 |
| S2 | 30.00 | 830.70 | 666.10 | 19.81 | 25.00 | 1.09 | 25.51 | 22.89 | 62.79 | 0.97 | 28.36 | 24.22 | 19.47 |
| S1 | 20.00 | 824.30 | 668.60 | 18.89 | 34.50 | 2.29 | 53.42 | 3.95 | 91.98 | 1.77 | 10.25 | 74.28 | 74.39 |
| | | | | | | 4.28 | 100.00 | 20.59 | 66.14 | 1.27 | 100.00 | 100.00 | 100.00 |

FILE : MASSB40

MASS BALANCE CALCULATIONS

118. Comp Meas Sample : SIT
HI - 1.990 2.015
LO - 1.975 1.965

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 656.20 | 549.60 | 16.25 | 0.00 | ERR | | 21.25 | 64.90 | 1.46 | | | |
| F | 30.00 | 853.50 | 687.60 | 19.44 | 16.00 | 0.70 | 17.37 | 60.27 | 4.28 | 0.31 | 53.78 | 1.09 | 4.51 |
| S2 | 30.00 | 794.20 | 628.40 | 20.88 | 23.00 | 0.99 | 24.53 | 26.35 | 57.02 | 0.95 | 33.45 | 20.57 | 19.53 |
| S1 | 20.00 | 998.80 | 808.40 | 19.06 | 35.50 | 2.35 | 58.09 | 4.28 | 91.66 | 1.56 | 12.77 | 78.33 | 75.95 |
| | | | | | | 4.04 | 100.00 | 19.47 | 67.98 | 1.19 | 100.00 | 100.00 | 100.00 |

119. Comp Meas Sample : SIT
HI - 1.985 2.009
LO - 1.975 1.967

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 916.60 | 780.30 | 14.87 | 0.00 | ERR | | 21.42 | 64.68 | 1.41 | | | |
| F | 30.00 | 740.10 | 599.00 | 19.06 | 21.00 | 0.93 | 22.69 | 59.96 | 4.72 | 0.36 | 64.50 | 1.64 | 6.75 |
| S2 | 30.00 | 849.50 | 686.30 | 19.21 | 22.00 | 0.97 | 23.72 | 21.82 | 64.45 | 1.01 | 24.55 | 23.38 | 19.79 |
| S1 | 20.00 | 913.50 | 729.80 | 20.11 | 33.50 | 2.19 | 53.59 | 4.31 | 91.52 | 1.66 | 10.95 | 74.98 | 73.47 |
| | | | | | | 4.08 | 100.00 | 21.09 | 65.40 | 1.21 | 100.00 | 100.00 | 100.00 |

120. Comp Meas Sample : SIT
HI - 1.980 2.011
LO - 1.975 1.956

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 1017.20 | 861.40 | 15.32 | 0.00 | ERR | | 21.24 | 64.99 | 1.39 | | | |
| F | 30.00 | 757.60 | 609.80 | 19.51 | 23.00 | 1.01 | 24.20 | 59.36 | 5.32 | 0.39 | 69.50 | 1.95 | 8.65 |
| S2 | 30.00 | 793.60 | 644.00 | 18.85 | 22.50 | 0.99 | 23.87 | 18.56 | 69.64 | 0.98 | 21.36 | 25.16 | 21.43 |
| S1 | 20.00 | 929.50 | 745.90 | 19.75 | 33.00 | 2.16 | 51.93 | 3.65 | 92.75 | 1.47 | 9.14 | 72.89 | 69.93 |
| | | | | | | 4.16 | 100.00 | 20.74 | 66.08 | 1.09 | 100.00 | 100.00 | 100.00 |

FILE : MASS841

MASS BALANCE CALCULATIONS

121. Comp Meas Sample : SIT
HI - 1.990 2.012
LO - 1.970 1.948

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 939.30 | 791.30 | 15.76 | 0.00 | ERR | | 21.09 | 65.07 | 1.54 | | | |
| F | 30.00 | 732.90 | 585.60 | 20.10 | 17.00 | 0.74 | 17.53 | 60.18 | 4.45 | 0.28 | 53.92 | 1.15 | 4.21 |
| S2 | 30.00 | 796.90 | 643.60 | 19.24 | 24.50 | 1.08 | 25.54 | 26.48 | 57.14 | 0.94 | 34.56 | 21.51 | 20.60 |
| S1 | 20.00 | 965.00 | 777.20 | 19.46 | 36.50 | 2.40 | 56.92 | 3.96 | 92.19 | 1.54 | 11.52 | 77.34 | 75.19 |
| | | | | | | 4.22 | 100.00 | 19.57 | 67.85 | 1.17 | 100.00 | 100.00 | 100.00 |

122. Comp Meas Sample : SIT
HI - 1.975 2.007
LO - 1.970 1.950

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 815.10 | 689.20 | 15.45 | 0.00 | ERR | | 21.96 | 63.59 | 1.65 | | | |
| F | 30.00 | 760.20 | 619.10 | 18.56 | 21.50 | 0.95 | 22.77 | 59.87 | 4.84 | 0.38 | 68.21 | 1.64 | 7.39 |
| S2 | 30.00 | 838.70 | 674.50 | 19.58 | 23.00 | 1.01 | 24.05 | 18.48 | 69.71 | 1.04 | 22.24 | 24.95 | 21.35 |
| S1 | 20.00 | 949.80 | 761.60 | 19.81 | 34.00 | 2.23 | 53.18 | 3.59 | 92.75 | 1.57 | 9.53 | 73.40 | 71.26 |
| | | | | | | 4.19 | 100.00 | 19.99 | 67.19 | 1.17 | 100.00 | 100.00 | 100.00 |

123. Comp Meas Sample : SIT
HI - 1.970 2.005
LO - 1.970 1.959

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/ (DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 854.60 | 724.90 | 15.18 | 0.00 | ERR | | 21.82 | 63.92 | 1.54 | | | |
| F | 30.00 | 772.00 | 617.90 | 19.96 | 24.00 | 1.05 | 24.65 | 59.77 | 5.03 | 0.35 | 65.67 | 1.96 | 7.84 |
| S2 | 30.00 | 864.10 | 697.90 | 19.23 | 24.00 | 1.06 | 24.87 | 21.35 | 64.88 | 1.01 | 23.89 | 25.46 | 22.84 |
| S1 | 20.00 | 1004.30 | 798.30 | 20.53 | 33.00 | 2.14 | 50.48 | 4.64 | 91.14 | 1.51 | 10.44 | 72.59 | 69.31 |
| | | | | | | 4.24 | 100.00 | 22.43 | 63.39 | 1.10 | 100.00 | 100.00 | 100.00 |

FILE : MASSB42

MASS BALANCE CALCULATIONS

124. Comp Meas Sample : PIF
HI - 1.965 2.000
LO - 1.970 1.962

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 925.20 | 773.70 | 16.37 | 0.00 | ERR | | 23.49 | 61.46 | 1.33 | | | |
| F | 30.00 | 784.40 | 632.30 | 19.39 | 25.00 | 1.10 | 24.94 | 59.37 | 5.63 | 0.39 | 68.04 | 2.18 | 8.49 |
| S2 | 30.00 | 875.80 | 708.70 | 19.08 | 24.50 | 1.08 | 24.53 | 19.76 | 67.66 | 1.06 | 22.28 | 25.77 | 22.70 |
| S1 | 20.00 | 965.20 | 784.40 | 18.73 | 33.50 | 2.22 | 50.53 | 4.17 | 91.84 | 1.56 | 9.68 | 72.05 | 68.81 |
| | | | | | | 4.40 | 100.00 | 21.76 | 64.41 | 1.15 | 100.00 | 100.00 | 100.00 |

125. Comp Meas Sample : PIF
HI - 1.960 1.990
LO - 1.970 1.964

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 11.80 | 757.90 | 662.20 | 12.63 | 36.50 | 4.41 | | 20.50 | 66.17 | 1.38 | | | |
| F | 30.00 | 796.60 | 641.60 | 19.46 | 25.50 | 1.12 | 23.98 | 58.40 | 7.10 | 0.45 | 70.00 | 2.54 | 8.83 |
| S2 | 30.00 | 783.00 | 631.10 | 19.40 | 27.50 | 1.21 | 25.88 | 15.71 | 74.04 | 1.09 | 20.32 | 28.56 | 23.08 |
| S1 | 20.00 | 962.20 | 775.80 | 19.37 | 35.50 | 2.34 | 50.13 | 3.86 | 92.23 | 1.66 | 9.67 | 68.90 | 68.09 |
| | | | | | | 4.66 | 100.00 | 20.01 | 67.11 | 1.22 | 100.00 | 100.00 | 100.00 |

126. Comp Meas Sample : PIF
HI - 1.955 1.994
LO - 1.970 1.958

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 893.40 | 749.10 | 16.15 | 0.00 | ERR | | 21.65 | 64.24 | 1.49 | | | |
| F | 30.00 | 807.10 | 651.70 | 19.25 | 24.00 | 1.06 | 25.92 | 58.95 | 6.28 | 0.40 | 73.41 | 2.47 | 8.60 |
| S2 | 30.00 | 816.90 | 658.50 | 19.39 | 19.00 | 0.83 | 20.48 | 16.26 | 73.20 | 1.06 | 16.00 | 22.77 | 18.02 |
| S1 | 20.00 | 950.00 | 780.90 | 17.80 | 32.50 | 2.18 | 53.60 | 4.11 | 91.84 | 1.65 | 10.58 | 74.76 | 73.38 |
| | | | | | | 4.07 | 100.00 | 20.81 | 65.85 | 1.21 | 100.00 | 100.00 | 100.00 |

FILE : MASSB43

MASS BALANCE CALCULATIONS

127. Comp Meas Sample : SIT
HI - 2.030 2.033
LO - 2.010 1.991

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 813.00 | 696.30 | 14.35 | 0.00 | ERR | | 20.48 | 65.94 | 1.64 | | | |
| F | 30.00 | 936.70 | 751.70 | 19.75 | 22.50 | 0.98 | 23.32 | 58.76 | 6.51 | 0.47 | 73.23 | 2.20 | 7.83 |
| S2 | 30.00 | 846.70 | 629.40 | 25.66 | 22.50 | 0.91 | 21.60 | 15.28 | 74.68 | 1.13 | 17.64 | 23.40 | 16.77 |
| S1 | 20.00 | 929.50 | 744.50 | 19.90 | 35.50 | 2.32 | 55.08 | 3.10 | 93.09 | 2.00 | 9.13 | 74.39 | 75.70 |
| | | | | | | 4.22 | 100.00 | 18.71 | 68.93 | 1.46 | 100.00 | 100.00 | 100.00 |

128. Comp Meas Sample : SIT
HI - 2.030 2.032
LO - 2.010 1.986

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 718.10 | 613.70 | 14.54 | 0.00 | ERR | | 20.86 | 64.89 | 2.09 | | | |
| F | 60.00 | 749.40 | 608.00 | 18.87 | 34.30 | 0.76 | 25.24 | 59.32 | 5.61 | 0.48 | 76.50 | 2.10 | 8.01 |
| S2 | 60.00 | 818.20 | 663.20 | 18.94 | 27.40 | 0.60 | 20.14 | 13.69 | 77.06 | 1.27 | 14.09 | 22.99 | 16.91 |
| S1 | 30.00 | 751.30 | 595.30 | 20.76 | 38.00 | 1.64 | 54.62 | 3.37 | 92.59 | 2.08 | 9.41 | 74.91 | 75.08 |
| | | | | | | 3.00 | 100.00 | 19.57 | 67.51 | 1.51 | 100.00 | 100.00 | 100.00 |

129. Comp Meas Sample : SIT
HI - 2.030 2.055
LO - 2.000 1.977

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 787.30 | 664.90 | 15.55 | 0.00 | ERR | | 20.64 | 65.55 | 1.78 | | | |
| F | 30.00 | 836.80 | 673.10 | 19.56 | 25.50 | 1.12 | 29.06 | 56.81 | 9.56 | 0.51 | 83.40 | 4.13 | 10.63 |
| S2 | 45.00 | 842.90 | 688.40 | 18.33 | 40.60 | 1.20 | 31.31 | 7.86 | 86.38 | 1.18 | 12.44 | 40.20 | 26.51 |
| S1 | 30.00 | 873.30 | 698.10 | 20.06 | 35.00 | 1.52 | 39.63 | 2.08 | 94.50 | 2.21 | 4.17 | 55.67 | 62.85 |
| | | | | | | 3.84 | 100.00 | 19.79 | 67.28 | 1.39 | 100.00 | 100.00 | 100.00 |

FILE : MASSB44

MASS BALANCE CALCULATIONS

130. Comp Meas Sample : SIT
HI - 2.030 2.048
LO - 2.010 1.984

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 12.06 | 778.30 | 657.60 | 15.51 | 32.30 | 3.70 | | 20.09 | 66.47 | 1.73 | | | |
| F | 30.00 | 857.40 | 695.50 | 18.88 | 24.50 | 1.08 | 26.58 | 58.89 | 6.32 | 0.46 | 78.69 | 2.50 | 8.70 |
| S2 | 45.00 | 791.90 | 644.90 | 18.56 | 32.60 | 0.96 | 23.67 | 12.04 | 79.70 | 1.24 | 14.33 | 28.11 | 20.88 |
| S1 | 20.00 | 729.10 | 587.20 | 19.46 | 30.80 | 2.03 | 49.76 | 2.79 | 93.59 | 1.99 | 6.98 | 69.39 | 70.43 |
| | | | | | | 4.07 | 100.00 | 19.89 | 67.11 | 1.41 | 100.00 | 100.00 | 100.00 |

131. Comp Meas Sample : SIT
HI - 2.020 2.039
LO - 1.990 1.955

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 856.00 | 713.90 | 16.60 | 0.00 | ERR | | 26.31 | 56.72 | 1.63 | | | |
| F | 45.00 | 768.70 | 615.60 | 19.92 | 31.00 | 0.90 | 27.83 | 59.75 | 5.08 | 0.33 | 66.20 | 2.40 | 6.89 |
| S2 | 60.00 | 777.70 | 626.30 | 19.47 | 35.20 | 0.77 | 23.83 | 26.51 | 56.90 | 1.13 | 25.15 | 23.02 | 20.20 |
| S1 | 30.00 | 920.40 | 731.10 | 20.57 | 36.20 | 1.57 | 48.34 | 4.49 | 90.88 | 2.01 | 8.64 | 74.58 | 72.91 |
| | | | | | | 3.24 | 100.00 | 25.11 | 58.91 | 1.33 | 100.00 | 100.00 | 100.00 |

132. Comp Meas Sample : SIT
HI - 2.010 2.031
LO - 2.000 1.976

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 836.00 | 707.60 | 15.36 | 0.00 | ERR | | 21.89 | 63.96 | 1.39 | | | |
| F | 60.00 | 859.00 | 691.00 | 19.56 | 38.50 | 0.84 | 26.20 | 58.19 | 7.44 | 0.44 | 72.39 | 2.98 | 9.14 |
| S2 | 60.00 | 824.80 | 666.40 | 19.20 | 34.00 | 0.75 | 23.24 | 16.80 | 72.24 | 1.17 | 18.54 | 25.67 | 21.55 |
| S1 | 30.00 | 827.70 | 659.50 | 20.32 | 37.50 | 1.63 | 50.56 | 3.78 | 92.29 | 1.73 | 9.07 | 71.35 | 69.31 |
| | | | | | | 3.22 | 100.00 | 21.06 | 65.40 | 1.26 | 100.00 | 100.00 | 100.00 |

FILE : MASSB45

MASS BALANCE CALCULATIONS

133. Comp Meas Sample : SIT
HI - 2.010 2.025
LO - 2.000 1.973

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY NI | RECOVERY K2O | RECOVERY NACL | RECOVERY NI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 823.60 | 695.90 | 15.51 | 0.00 | ERR | | 22.08 | 63.64 | 1.41 | | | |
| F | 45.00 | 798.20 | 647.30 | 18.91 | 30.30 | 0.89 | 25.32 | 58.45 | 7.06 | 0.41 | 74.65 | 2.68 | 8.37 |
| S2 | 60.00 | 848.90 | 684.40 | 19.38 | 38.00 | 0.83 | 23.86 | 14.22 | 76.36 | 1.13 | 16.98 | 27.14 | 21.57 |
| S1 | 30.00 | 778.40 | 620.10 | 20.34 | 40.80 | 1.77 | 50.63 | 3.30 | 93.05 | 1.73 | 8.36 | 70.17 | 70.06 |
| | | | | | | 3.50 | 100.00 | 19.98 | 67.13 | 1.25 | 100.00 | 100.00 | 100.00 |

FILE : MASSB46

MASS BALANCE CALCULATIONS

134. Comp Meas Sample : PIF
HI - 2.010 2.059
LO - 2.000 1.977

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 715.20 | 623.50 | 12.82 | 0.00 | ERR | | 23.23 | 60.64 | 2.59 | | | |
| F | 30.00 | 764.20 | 629.80 | 17.59 | 25.50 | 1.14 | 28.78 | 57.96 | 7.47 | 0.78 | 75.87 | 3.41 | 10.71 |
| S2 | 30.00 | 878.30 | 714.30 | 18.67 | 22.50 | 1.00 | 25.06 | 14.23 | 75.62 | 1.85 | 16.22 | 30.03 | 22.12 |
| S1 | 30.00 | 691.10 | 568.30 | 17.77 | 41.00 | 1.84 | 46.17 | 3.77 | 90.98 | 3.05 | 7.92 | 66.57 | 67.18 |
| | | | | | | 3.98 | 100.00 | 21.99 | 63.10 | 2.10 | 100.00 | 100.00 | 100.00 |

135. Comp Meas Sample : PIF
HI - 2.010 2.045
LO - 1.970 1.952

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 736.00 | 651.60 | 11.47 | 0.00 | ERR | | 23.14 | 60.77 | 2.60 | | | |
| F | 60.00 | 787.60 | 636.00 | 19.25 | 26.00 | 0.57 | 21.43 | 60.23 | 4.11 | 0.54 | 58.88 | 1.40 | 5.15 |
| S2 | 60.00 | 808.70 | 704.90 | 12.84 | 31.00 | 0.74 | 27.58 | 24.33 | 59.55 | 1.93 | 30.61 | 26.05 | 23.67 |
| S1 | 30.00 | 866.30 | 665.80 | 23.14 | 32.50 | 1.36 | 50.99 | 4.52 | 89.70 | 3.14 | 10.51 | 72.56 | 71.19 |
| | | | | | | 2.67 | 100.00 | 21.92 | 63.05 | 2.25 | 100.00 | 100.00 | 100.00 |

136. Comp Meas Sample : PIF
HI - 2.01 2.11
LO - 1.97 1.98

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 757.00 | 648.00 | 14.40 | 0.00 | ERR | | 24.73 | 58.57 | 2.28 | | | |
| F | 15.00 | 806.10 | 657.40 | 18.45 | 32.00 | 2.84 | 42.35 | 51.89 | 16.97 | 0.89 | 87.19 | 12.26 | 25.50 |
| S2 | 15.00 | 811.10 | 667.70 | 17.68 | 31.50 | 2.82 | 42.08 | 6.83 | 87.28 | 1.91 | 11.40 | 62.66 | 54.39 |
| S1 | 30.00 | 941.80 | 752.50 | 20.10 | 24.00 | 1.04 | 15.56 | 2.28 | 94.48 | 1.91 | 1.41 | 25.08 | 20.11 |
| | | | | | | 6.71 | 100.00 | 25.21 | 58.62 | 1.48 | 100.00 | 100.00 | 100.00 |

FILE : MASSB47

MASS BALANCE CALCULATIONS

137. Comp Meas Sample : PIF
HI - 2.030 2.014
LO - 1.970 1.913

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 724.00 | 630.80 | 12.87 | 0.00 | ERR | | 22.16 | 62.75 | 2.17 | | | |
| F | 120.00 | 704.10 | 560.70 | 20.37 | 5.00 | 0.05 | 1.00 | 60.03 | 4.66 | 0.31 | 3.07 | 0.07 | 0.16 |
| S2 | 30.00 | 651.00 | 522.20 | 19.78 | 24.00 | 1.05 | 19.35 | 42.09 | 32.35 | 1.02 | 41.61 | 9.34 | 10.15 |
| S1 | 10.00 | 647.10 | 534.00 | 17.48 | 32.00 | 4.31 | 79.64 | 13.60 | 76.28 | 2.19 | 55.32 | 90.59 | 89.69 |
| | | | | | | 5.42 | 100.00 | 19.58 | 67.06 | 1.94 | 100.00 | 100.00 | 100.00 |

138. Comp Meas Sample : PIF
HI - 2.050 2.002
LO - 2.020 1.950

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 718.90 | 627.10 | 12.77 | 0.00 | ERR | | 22.14 | 62.51 | 2.44 | | | |
| F | 60.00 | 879.40 | 707.40 | 19.56 | 21.00 | 0.46 | 8.24 | 60.38 | 4.11 | 0.31 | 23.57 | 0.53 | 1.10 |
| S2 | 30.00 | 821.20 | 665.00 | 19.02 | 26.50 | 1.17 | 20.94 | 40.78 | 32.94 | 2.50 | 40.44 | 10.73 | 22.57 |
| S1 | 10.00 | 760.60 | 634.60 | 16.57 | 29.00 | 3.95 | 70.82 | 10.73 | 80.51 | 2.50 | 35.99 | 88.74 | 76.33 |
| | | | | | | 5.58 | 100.00 | 21.11 | 64.26 | 2.32 | 100.00 | 100.00 | 100.00 |

139. Comp Meas Sample : PIF
HI - 2.062 2.019
LO - 2.020 1.950

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 596.60 | 513.70 | 13.90 | 0.00 | ERR | | 23.52 | 60.50 | 2.27 | | | |
| F | 30.00 | 761.60 | 633.60 | 16.81 | 30.00 | 1.36 | 24.64 | 58.01 | 7.62 | 0.55 | 63.76 | 3.01 | 6.14 |
| S2 | 30.00 | 708.80 | 579.70 | 18.21 | 31.50 | 1.40 | 25.43 | 21.44 | 63.31 | 2.75 | 24.32 | 25.84 | 31.68 |
| S1 | 20.00 | 755.20 | 621.00 | 17.77 | 41.00 | 2.75 | 49.93 | 5.35 | 88.78 | 2.75 | 11.92 | 71.14 | 62.18 |
| | | | | | | 5.51 | 100.00 | 22.42 | 62.30 | 2.21 | 100.00 | 100.00 | 100.00 |

FILE : MASSB48

MASS BALANCE CALCULATIONS

140. Comp Meas Sample : PIF
HI - 2.062 2.035
LO - 2.030 1.962

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 648.70 | 551.80 | 14.94 | 0.00 | ERR | | 23.80 | 60.14 | 2.18 | | | |
| F | 20.00 | 707.50 | 574.10 | 18.86 | 40.00 | 2.65 | 35.94 | 52.07 | 16.77 | 0.80 | 83.99 | 9.57 | 16.39 |
| S2 | 30.00 | 781.50 | 654.50 | 16.25 | 44.00 | 2.01 | 27.20 | 7.68 | 86.08 | 1.76 | 9.38 | 37.18 | 27.29 |
| S1 | 20.00 | 739.00 | 600.10 | 18.80 | 41.00 | 2.72 | 36.86 | 4.01 | 90.97 | 2.68 | 6.63 | 53.25 | 56.32 |
| | | | | | | 7.38 | 100.00 | 22.28 | 62.98 | 1.75 | 100.00 | 100.00 | 100.00 |

141. Comp Meas Sample : PIF
HI - 2.062 2.032
LO - 2.030 1.95 ( ? )

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 709.70 | 614.10 | 13.47 | 0.00 | ERR | | 21.92 | 62.15 | 3.15 | | | |
| F | 21.00 | 881.00 | 701.50 | 20.37 | 36.50 | 2.26 | 32.75 | 53.73 | 14.10 | 0.84 | 80.00 | 7.31 | 13.77 |
| S2 | 20.00 | 773.60 | 647.30 | 16.33 | 26.50 | 1.81 | 26.23 | 10.23 | 82.12 | 1.69 | 12.20 | 34.10 | 22.19 |
| S1 | 20.00 | 816.30 | 681.90 | 16.46 | 41.50 | 2.83 | 41.02 | 4.18 | 90.26 | 3.12 | 7.80 | 58.59 | 64.04 |
| | | | | | | 6.90 | 100.00 | 21.99 | 63.18 | 2.00 | 100.00 | 100.00 | 100.00 |

142. Comp Meas Sample : PIF
HI - 2.062 2.040
LO - 2.020 1.974

| SAMPLE | TIME ( SEC ) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/( DRY ) | WT % | ASSAY K2O | ASSAY NACL | ASSAY WI | RECOVERY K2O | RECOVERY NACL | RECOVERY WI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 699.50 | 600.80 | 14.11 | 0.00 | ERR | | 22.52 | 61.76 | 2.59 | | | |
| F | 20.00 | 814.80 | 650.60 | 20.15 | 48.00 | 3.13 | 38.72 | 51.93 | 16.99 | 0.80 | 83.75 | 10.92 | 18.00 |
| S2 | 20.00 | 589.40 | 492.60 | 16.42 | 38.50 | 2.63 | 32.51 | 8.78 | 84.46 | 1.64 | 11.89 | 45.55 | 30.99 |
| S1 | 20.00 | 626.20 | 502.40 | 19.77 | 35.50 | 2.33 | 28.77 | 3.64 | 91.19 | 3.05 | 4.36 | 43.53 | 51.01 |
| | | | | | | 8.08 | 100.00 | 24.01 | 60.27 | 1.72 | 100.00 | 100.00 | 100.00 |

FILE : MASSB49

MASS BALANCE CALCULATIONS

143. Comp Meas Sample : PIF
HI - 2.062 2.048
LO - 2.000 1.983

| SAMPLE | TIME (SEC) | WET WEIGHT | DRY WEIGHT | % MOISTURE | WAREHOUSE WEIGHT | TONNES/(DRY) | WT % | ASSAY K2O | ASSAY NACL | ASSAY MI | RECOVERY K2O | RECOVERY NACL | RECOVERY MI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEED | 0.00 | 684.30 | 586.60 | 14.28 | 0.00 | ERR | | 22.66 | 61.95 | 2.18 | | | |
| F | 20.00 | 786.80 | 697.50 | 11.35 | 31.00 | 2.24 | 27.99 | 56.84 | 9.22 | 0.80 | 66.27 | 4.29 | 12.05 |
| S2 | 20.00 | 696.10 | 578.40 | 16.91 | 38.00 | 2.58 | 32.16 | 19.19 | 67.86 | 1.76 | 25.71 | 36.29 | 30.46 |
| S1 | [illegible]00 | 628.00 | 534.20 | 14.94 | 46.00 | 3.20 | 39.85 | 4.83 | 89.67 | 2.68 | 8.02 | 59.42 | 57.49 |
| | | | | | | 8.02 | 100.00 | 24.01 | 60.14 | 1.86 | 100.00 | 100.00 | 100.00 |

FILE : MASSB30

# APPENDIX 2

TRI FLO PILOT PLANT TESTWORK

KEY

SAMPLE : PIF = PRIMARY INSOL FEED
PIT = PRIMARY INSOL TAIL
SIT = SECONDARY INSOL TAIL

MEDIA BLEND : B = MAGNETITE/FERROSIL.
M = MAGNETITE ALONE

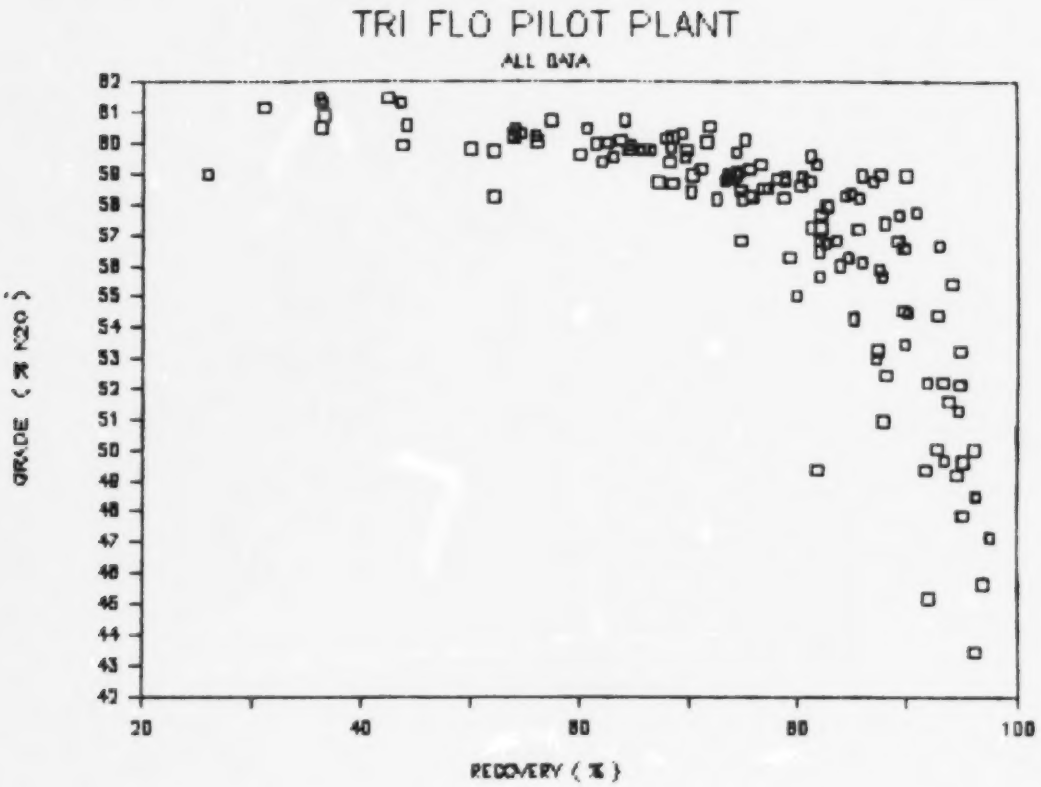
FEED SIZE : N = NORMAL FLOTATION FE
C = COARSER THAN NORMAL

| T | SAMPLE | DENSITY ( MEAS ) HI | DENSITY ( MEAS ) LOW | K20 GRADE | K20 RECOVERY | MEDIA BLEND | FEED SIZE |
|---|---|---|---|---|---|---|---|
| 73 | PIF | 2.03 | 1.94 | 61.5 | 42 | B | N |
| 83 | PIF | 2.02 | 1.96 | 61.4 | 36 | B | N |
| 74 | PIF | 2.02 | 1.95 | 61.3 | 44 | B | N |
| 86 | PIF | 2.02 | 1.97 | 61.3 | 36 | B | N |
| 65 | PIF | 2.05 | 1.98 | 61.2 | 31 | B | N |
| 82 | PIF | 2.04 | 1.97 | 60.9 | 37 | B | N |
| 5 | SIT | 2.11 | 2.00 | 60.8 | 64 | B | N |
| 115 | SIT | 2.04 | 1.97 | 60.8 | 57 | B | N |
| 64 | PIF | 2.04 | 1.98 | 60.6 | 44 | B | N |
| 4 | SIT | 2.11 | 2.03 | 60.6 | 72 | B | N |
| 6 | SIT | 2.11 | 1.99 | 60.5 | 36 | B | N |
| 116 | SIT | 2.00 | 1.97 | 60.5 | 54 | B | N |
| 12 | SIT | 2.16 | 2.00 | 60.5 | 61 | B | N |
| 138 | PIF | 2.00 | 1.95 | 60.4 | 24 | M | C |
| 79 | PIF | 2.01 | 1.99 | 60.3 | 69 | B | N |
| 66 | PIF | 2.06 | 1.97 | 60.3 | 54 | B | N |
| 118 | SIT | 2.02 | 1.97 | 60.3 | 54 | B | N |
| 114 | SIT | 2.05 | 1.97 | 60.3 | 56 | B | N |
| 135 | PIF | 2.05 | 1.95 | 60.2 | 59 | B | C |
| 80 | PIF | 2.02 | 1.99 | 60.2 | 68 | B | N |
| 121 | SIT | 2.01 | 1.95 | 60.2 | 54 | B | N |
| 39 | SIT | 2.17 | 1.98 | 60.2 | 68 | B | N |
| 54 | PIF | 2.08 | 2.01 | 60.1 | 75 | B | N |
| 51 | PIF | 2.08 | 1.97 | 60.1 | 64 | B | N |
| 11 | SIT | 2.16 | 2.02 | 60.1 | 72 | B | N |
| 38 | SIT | 2.17 | 1.99 | 60.1 | 56 | B | N |
| 137 | PIF | 2.01 | 1.91 | 60.0 | 3 | M | C |
| 88 | PIF | 2.03 | 1.98 | 60.0 | 62 | B | N |
| 17 | SIT | 2.02 | 1.96 | 60.0 | 61 | B | N |
| 119 | SIT | 2.01 | 1.97 | 60.0 | 65 | B | N |
| 96 | PIF | 2.05 | 1.98 | 60.0 | 44 | B | N |
| 22 | SIT | 2.01 | 1.95 | 59.9 | 68 | B | N |
| 67 | PIF | 2.06 | 2.00 | 59.8 | 50 | B | N |
| 72 | PIF | 2.03 | 1.96 | 59.8 | 70 | B | N |
| 23 | SIT | 2.01 | 1.96 | 59.8 | 66 | B | N |
| 31 | SIT | 2.04 | 1.96 | 59.8 | 66 | B | N |
| 36 | PIT | 2.17 | 1.98 | 59.8 | 64 | B | N |
| 53 | PIF | 2.09 | 1.98 | 59.7 | 52 | B | N |
| 78 | PIF | 2.03 | 1.98 | 59.7 | 74 | B | N |
| 75 | PIF | 2.03 | 1.96 | 59.6 | 60 | B | N |
| 77 | PIF | 2.04 | 1.99 | 59.6 | 81 | B | N |
| 20 | SIT | 2.01 | 1.96 | 59.6 | 70 | B | N |
| 44 | PIF | 2.15 | 2.01 | 59.5 | 63 | B | N |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 47 | PIF | 2.08 | 2.01 | 59.4 | 62 | B | | | N |
| 124 | SIT | 2.00 | 1.96 | 59.4 | 68 | B | | | N |
| 128 | SIT | 2.03 | 1.99 | 59.3 | 77 | B | | | N |
| 61 | PIF | 2.06 | 2.02 | 59.3 | 82 | B | | | N |
| 55 | PIF | 2.09 | 2.01 | 59.2 | 75 | B | | | N |
| 63 | PIF | 2.05 | 1.97 | 59.1 | 71 | B | | | N |
| 90 | PIF | 2.04 | 1.98 | 59.1 | 74 | B | | | N |
| 49 | PIF | 2.08 | 2.00 | 59.0 | 88 | B | | | N |
| 22 | SIT | 2.17 | 1.97 | 59.0 | 26 | B | | | N |
| 35 | PIT | 2.18 | 2.03 | 59.0 | 86 | B | | | N |
| 110 | SIT | 2.03 | 1.96 | 59.0 | 74 | B | | | N |
| 52 | PIF | 2.10 | 2.01 | 59.0 | 70 | B | | | N |
| 97 | PIF | 2.03 | 1.96 | 59.0 | 90 | B | | | N |
| 126 | SIT | 1.99 | 1.96 | 59.0 | 73 | B | | | N |
| 43 | PIF | 2.16 | 2.02 | 58.9 | 80 | B | | | N |
| 130 | SIT | 2.05 | 1.98 | 58.9 | 79 | B | | | N |
| 37 | PIF | 2.17 | 1.98 | 58.9 | 74 | B | | | N |
| 50 | PIF | 2.08 | 2.00 | 58.8 | 78 | B | | | N |
| 87 | PIF | 2.05 | 2.00 | 58.8 | 87 | B | | | N |
| 59 | PIF | 2.08 | 1.99 | 58.8 | 79 | B | | | N |
| 62 | PIF | 2.05 | 2.02 | 58.8 | 81 | B | | | N |
| 127 | SIT | 2.03 | 1.99 | 58.8 | 73 | B | | | N |
| 95 | PIF | 2.05 | 1.98 | 58.7 | 67 | B | | | N |
| 68 | PIF | 2.06 | 1.99 | 58.7 | 68 | B | | | N |
| 45 | PIF | 2.16 | 2.02 | 58.6 | 80 | B | | | N |
| 98 | PIF | 2.03 | 2.00 | 58.5 | 77 | B | | | N |
| 112 | SIT | 2.02 | 1.96 | 58.5 | 77 | B | | | N |
| 133 | SIT | 2.03 | 1.97 | 58.5 | 75 | B | | | N |
| 125 | SIT | 1.99 | 1.96 | 58.4 | 70 | B | | | N |
| 57 | PIF | 2.08 | 2.04 | 58.4 | 85 | B | | | N |
| 60 | PIF | 2.06 | 2.00 | 58.3 | 76 | B | | | N |
| 42 | PIF | 2.16 | 2.05 | 58.3 | 84 | B | | | N |
| 111 | SIT | 2.02 | 1.95 | 58.3 | 76 | B | | | N |
| 23 | PIT | 2.19 | 1.97 | 58.3 | 52 | B | | | N |
| 10 | SIT | 2.15 | 2.04 | 58.2 | 86 | B | | | N |
| 94 | PIF | 2.04 | 2.00 | 58.2 | 79 | B | | | N |
| 69 | PIF | 2.06 | 1.99 | 58.2 | 75 | B | | | N |
| 132 | SIT | 2.03 | 1.98 | 58.2 | 72 | B | | | N |
| 139 | PIF | 2.02 | 1.95 | 58.0 | 64 | | M | C | |
| 48 | PIF | 2.09 | 2.01 | 58.0 | 83 | B | | | N |
| 40 | SIT | 2.16 | 2.00 | 58.0 | 83 | B | | | N |
| 134 | PIF | 2.06 | 1.98 | 58.0 | 76 | B | | C | |
| 9 | SIT | 2.16 | 2.06 | 57.8 | 91 | B | | | N |
| 100 | PIF | 2.03 | 1.99 | 57.7 | 82 | B | | | N |
| 34 | SIT | 2.18 | 2.05 | 57.7 | 89 | B | | | N |
| 84 | PIF | 2.05 | 1.98 | 57.4 | 88 | B | | | N |
| 89 | PIF | 2.04 | 2.00 | 57.3 | 82 | B | | | N |
| 92 | PIF | 2.05 | 1.99 | 57.3 | 81 | B | | | N |
| 58 | PIF | 2.08 | 2.02 | 57.2 | 85 | B | | | N |
| 56 | PIF | 2.08 | 2.02 | 56.8 | 82 | B | | | N |
| 143 | PIF | 2.05 | 1.98 | 56.8 | 66 | | M | C | |
| 103 | PIF | 1.97 | 1.99 | 56.8 | 75 | B | | | N |
| 129 | SIT | 2.06 | 1.98 | 56.8 | 83 | B | | | N |
| 33 | PIF | 2.18 | 2.05 | 56.8 | 89 | B | | | N |
| 101 | PIF | 2.03 | 1.99 | 56.8 | 82 | B | | | N |
| 8 | SIT | 2.16 | 2.09 | 56.6 | 93 | B | | | N |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 41 | SIT | 2.17 | 2.01 | 56.6 | 90 | B | | N |
| 107 | PIF | 2.04 | 1.98 | 56.5 | 82 | B | | N |
| 71 | PIF | 2.06 | 1.95 | 56.3 | 79 | B | | N |
| 106 | PIF | 2.03 | 1.98 | 56.3 | 85 | B | | N |
| 3 | SIT | 2.10 | 2.03 | 56.1 | 86 | B | | N |
| 108 | PIF | 2.04 | 2.01 | 56.0 | 84 | B | | N |
| 46 | PIF | 2.15 | 2.05 | 55.9 | 87 | B | | N |
| 85 | PIF | 2.04 | 2.00 | 55.7 | 88 | B | | N |
| 13 | SIT | 2.02 | 1.97 | 55.7 | 82 | B | | N |
| 30 | PIT | 2.18 | 2.06 | 55.4 | 94 | B | | N |
| 91 | PIF | 2.04 | 2.00 | 55.1 | 80 | B | | N |
| 93 | PIF | 2.05 | 2.00 | 54.6 | 90 | B | | N |
| 2 | SIT | 2.10 | 2.05 | 54.5 | 90 | B | | N |
| 1 | SIT | 2.11 | 2.07 | 54.4 | 93 | B | | N |
| 21 | SIT | 2.17 | 1.99 | 54.3 | 85 | B | | N |
| 141 | PIF | 2.03 | 1.95 | 53.7 | 80 | | M | C |
| 76 | PIF | 2.01 | 1.98 | 53.5 | 90 | B | | N |
| 20 | SIT | 2.21 | 2.01 | 53.3 | 87 | B | | N |
| 25 | SIT | 2.19 | 2.10 | 53.3 | 95 | B | | N |
| 104 | PIF | 2.05 | 1.99 | 53.0 | 87 | B | | N |
| 70 | PIF | 2.08 | 2.01 | 52.5 | 88 | B | | N |
| 32 | PIF | 2.17 | 2.07 | 52.2 | 93 | B | | N |
| 19 | SIT | 2.21 | 2.03 | 52.2 | 92 | B | | N |
| 26 | PIF | 2.18 | 2.10 | 52.2 | 95 | B | | N |
| 40 | PIF | 2.04 | 1.96 | 52.1 | 84 | | M | C |
| 142 | PIF | 2.04 | 1.97 | 51.9 | 84 | | M | C |
| 136 | PIF | 2.11 | 1.98 | 51.9 | 87 | B | | C |
| 18 | SIT | 2.19 | 2.04 | 51.6 | 94 | B | | N |
| 31 | SIT | 2.18 | 2.07 | 51.3 | 95 | B | | N |
| 109 | PIF | 2.03 | 1.98 | 51.0 | 88 | B | | N |
| 7 | SIT | 2.15 | 2.09 | 50.1 | 93 | B | | N |
| 27 | SIT | 2.18 | 2.10 | 50.0 | 96 | B | | N |
| 81 | PIF | 2.02 | 1.99 | 49.7 | 93 | B | | N |
| 17 | SIT | 2.19 | 2.06 | 49.6 | 95 | B | | N |
| 99 | PIF | 2.04 | 1.99 | 49.4 | 92 | B | | N |
| 102 | PIF | 2.03 | 1.98 | 49.4 | 82 | B | | N |
| 24 | PIT | 2.20 | 1.99 | 49.2 | 95 | B | | N |
| 28 | SIT | 2.17 | 2.10 | 48.5 | 96 | B | | N |
| 16 | SIT | 2.21 | 2.05 | 47.9 | 95 | B | | N |
| 29 | PIF | 2.17 | 2.10 | 47.2 | 98 | B | | N |
| 15 | SIT | 2.20 | 2.08 | 45.7 | 97 | B | | N |
| 105 | PIF | 2.05 | 2.01 | 45.2 | 92 | B | | N |
| 14 | SIT | 2.19 | 2.09 | 43.5 | 96 | B | | N |

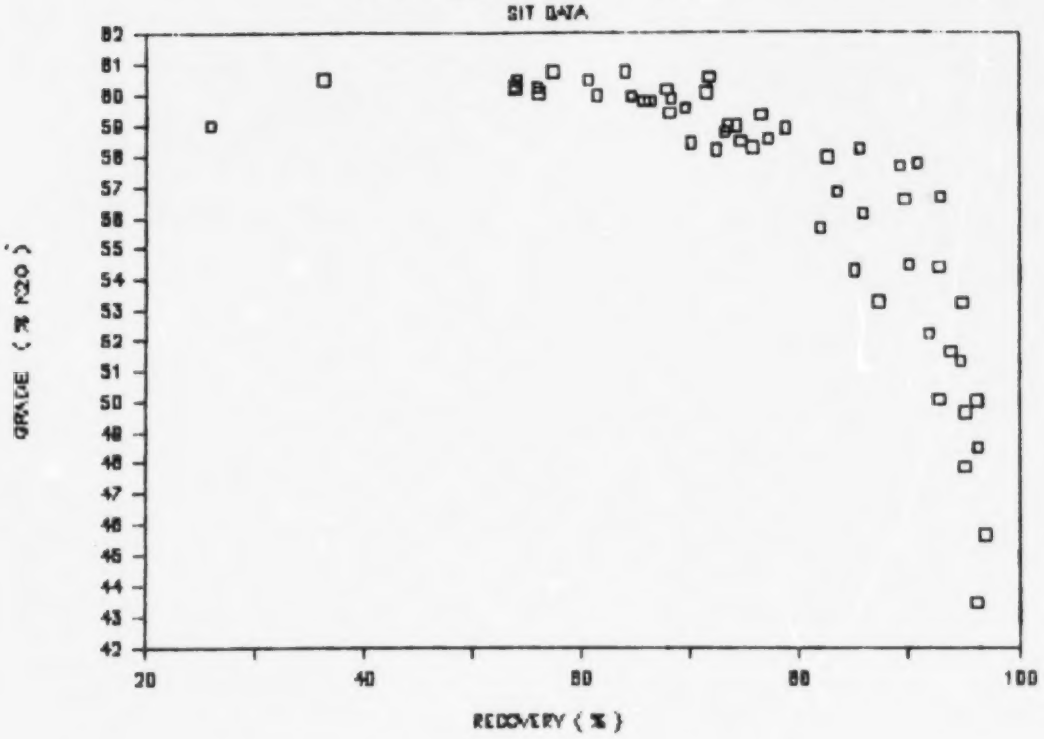
# APPENDIX 3

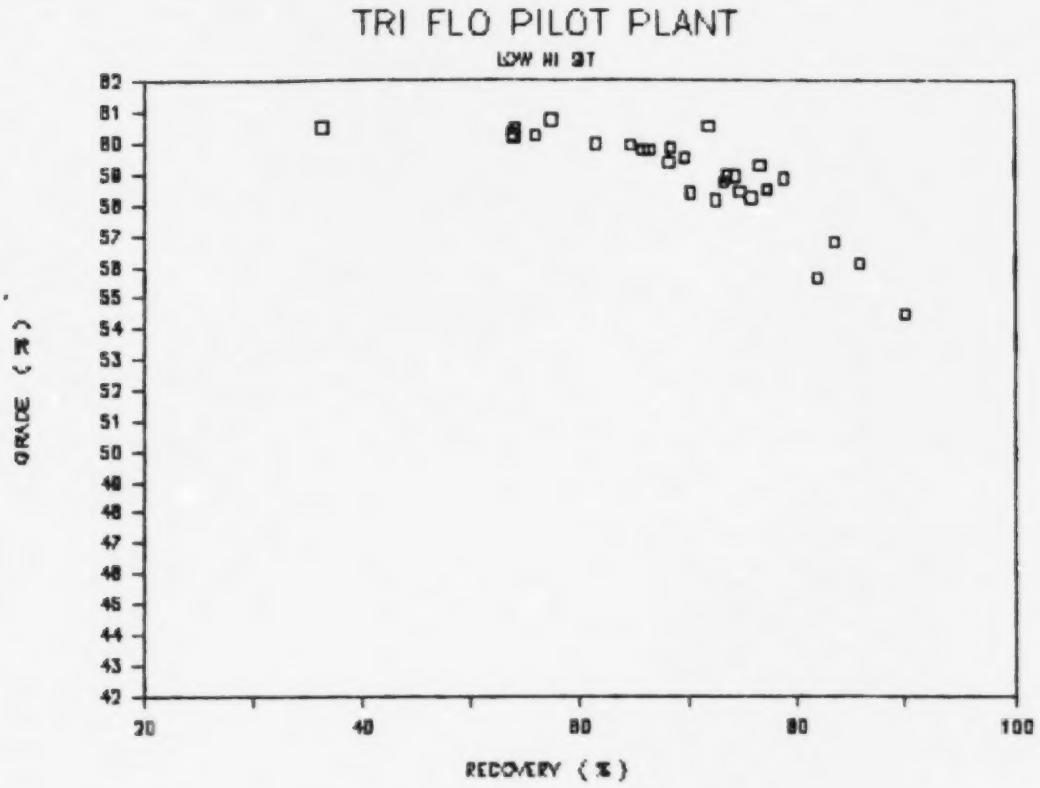



* All Data - Graph of float product grade/recovery points for all tests performed.

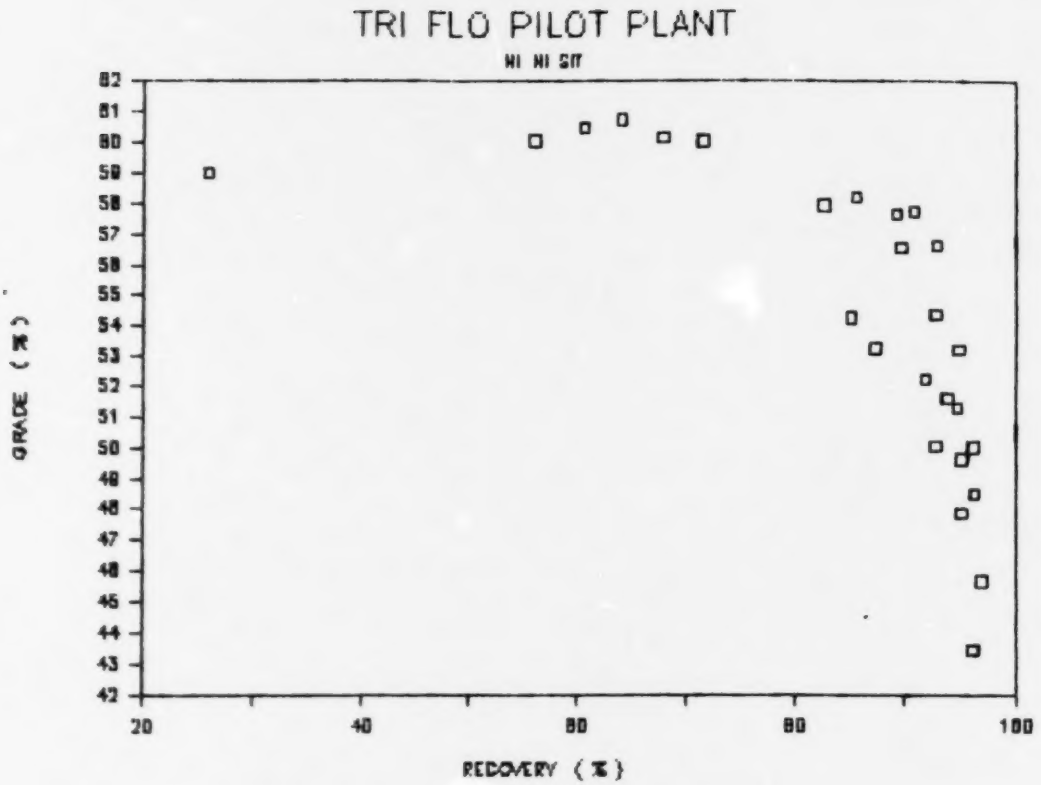
# TRI FLO PILOT PLANT

SIT DATA

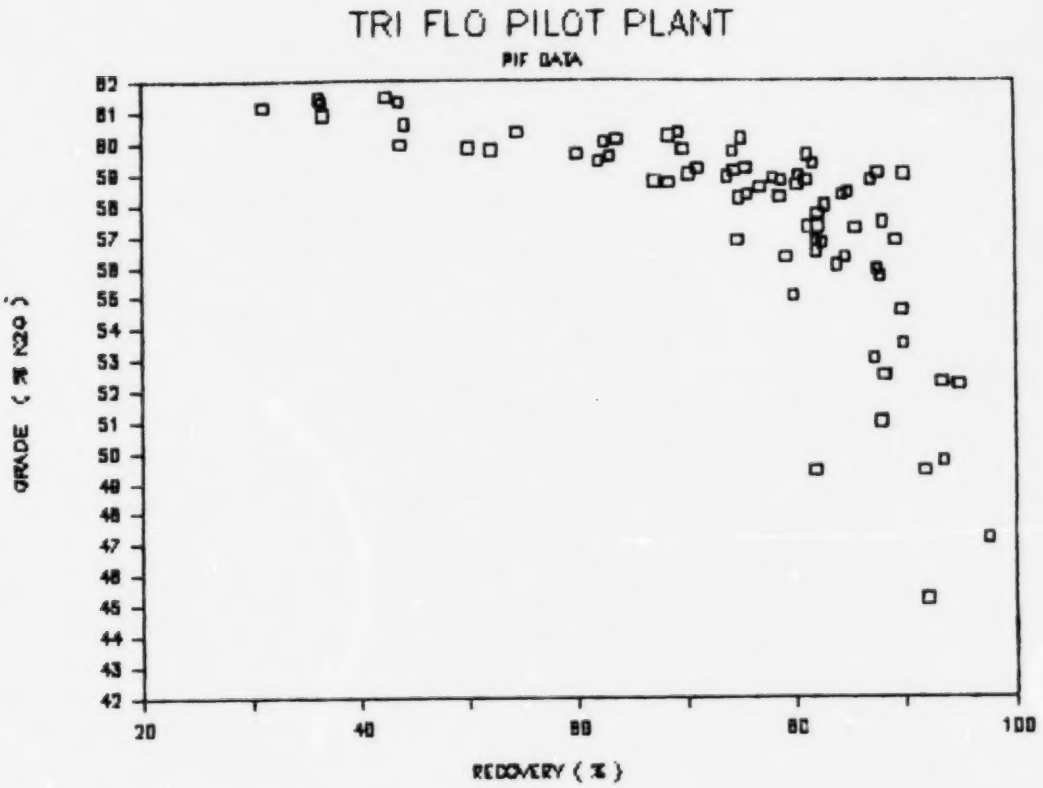




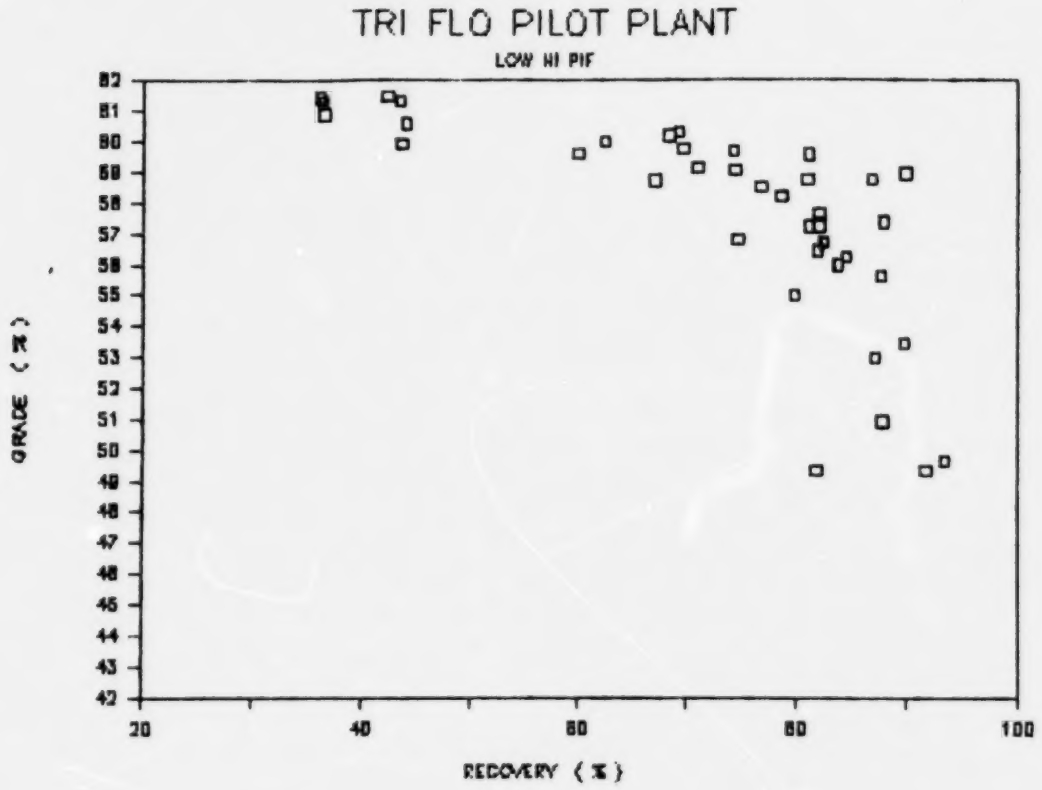

* Low Hi SIT - Graph of float product grade/recovery points for secondary insol tails material tests conducted with a high media density below 2.07.



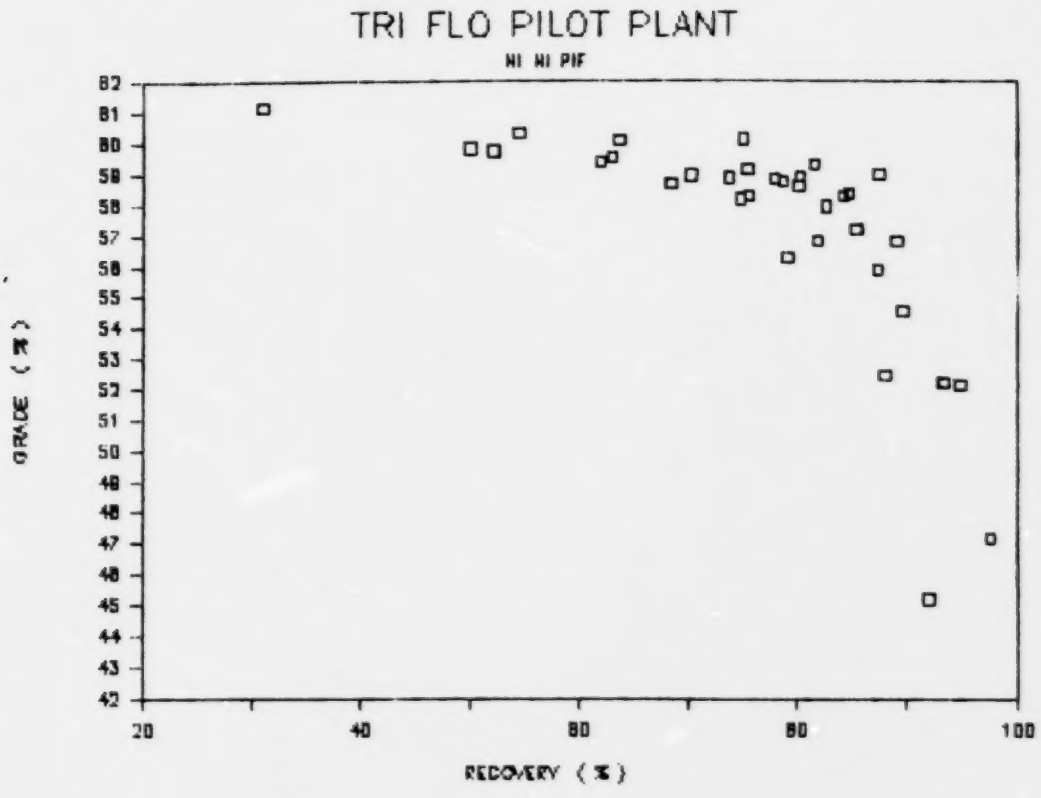

* Hi Hi SIT - Graph of float product grade/recovery points for secondary insol tails material tests conducted with a high media density above 2.07.



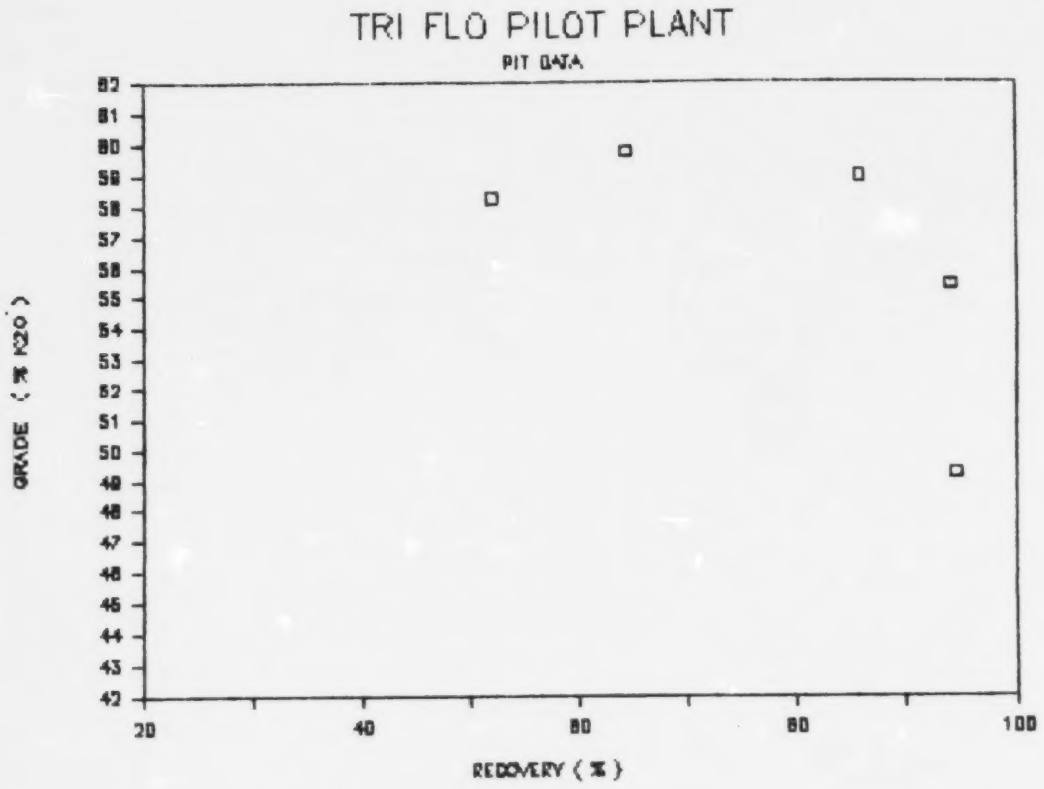

* PIF Data - Graph of float product grade/recovery points for all tests on the primary insol feed material.




* Low Hi PIF - Graph of float product grade/recovery points for primary insol feed material tests conducted with a high media density below 2.07.




* Hi Hi PIF - Graph of float product grade/recovery points for primary insol feed material tests conducted with a hi media density above 2.07.




* PIT Data - Graph of float product grade/recovery points for all tests on the primary insol tails material.

# APPENDIX 4

# HEAVY MEDIA SEPARATION PILOT PLANT MANUAL

J. H. Dunn
G. A. White

October, 1987

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| | |
|---|---|
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| 2.000 | What It Does |
| 3.000 | How It Works |
| Appendix 1 | Figures |

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Figure 1A Input/Output Diagram

Figure 1B Functional Block Diagram

Figure 2 Equipment

Figure 3 Flowsheet

Figure 4 Tri-Flo Separator Schematic

Figure 5 HMS Plant Incorporation in Existing Plant

## 1.000 Heavy Media Separation Step

This workbook covers the operator of the Heavy Media Separation Pilot Plant.

## 1.200 Learner's Objectives

The learner will be able to:

1. Draw an input/output diagram of the Heavy Media step.
2. Draw a functional block diagram of the Heavy Media step.
3. State what each of the sub-steps do and explain how they work.
4. Identify all of the components of each of the steps in the field.
5. Describe how to tell if the Heavy Media Separation step is doing what it is supposed to do (that is, explain evidence of good operation).
6. Identify all of the instruments and controls used to operate this step and list the 'normal operating conditions'.
7. Operate the Heavy Media Separation step through:

   Pre start-up
   Start-up
   Follow-up and Run
   Shutdown (Normal and Emergency)
   Special Procedures

8. Troubleshoot the step and be able to determine the causes for 'off normal' operation.
9. Operate the Heavy Media Separation step safely.

## 1.300 What to Expect

This workbook is designed to be a self study workbook with a 1-2 hour group session. Any questions you have, you are expected to raise or 'dig in' yourself to search for the answers.

## 2.000 About the Heavy Media Separation Step

The Heavy Media Separation step is designed to separate coarser potash particles from the salt and insoluble (clay) components of the ore.

## 2.100 What the Heavy Media Separation Step Does

The Heavy Media Separation pilot plant will take in scrubbed flotation feed stock from the crushing step.

It produces wet potash concentrate known as Float (F).

It uses:

- magnetite to get the media to the right specific gravity range for operation of the Tri-Flo separator.
- reclaim brine for washing and as a carrier for the magnetite.
- dry, instrument air to operate instrumentation.
- gland water for the proper operation of the centrifugal pump gland packings.

In addition to the wet potash concentrate float, it gives off:

- middlings (Sink 2-$S_2$) which is primarily a salt and potash mixture with small amounts of insoluble material which would be recrushed and fed back to the flotation step. (Refer to Figure 1A 'Input/Output').
- Tails (Sink 1-$S_1$) which is mainly salt and insol with small amounts of KCl which will be crushed and returned to regrind flotation. (refer to Figure 1A 'Input/Output').

Figure 5 details a full plant installation.

For the purposes of the Heavy Media Separation pilot project, the float, middlings and tails will be recombined and returned to the flotation step.

In order to do these things, the step divides into the following functional blocks: Screening and Debrining, Separating, Debrining and Magnetite Recovery. (Refer to Figure 1B - Functional Block Diagram).

In the screening and debrining block, a portion of the scrubbed flotation feed stock is screened to remove -20 mesh fines which the Tri-Flo separator does not work well on and debrined in order to provide as dry a feed material to the Tri-Flo separator as possible.

In the separating block the oversize potash feed is separated into the float, middlings and tails products.

In the debrining block the three product streams are drained to remove the media and rinsed with reclaim brine to remove the remaining media.

In the magnetite recovery block the recovered (under dense) media has the magnetite recovered from it and the excess brine is rejected from the pilot plant.

## 2.110 Why the Heavy Media Separation Step Is Important

The oversize flotation feed from the crushing step does not float well and currently would pass through the rougher flotation as tails and then would have to be recrushed to a smaller size and floated off in regrind flotation.

A successful Heavy Media Separation operation would greatly increase our recovery of natural coarse and granular potash in the initial stages of flotation. These are our 'premium' products. The only way we can produce granular product presently is through compaction.

Being able to recover this coarser size material at this point dramatically reduces our downstream processing costs (i.e. drying, compacting).

**2.200 What the Heavy Media Separation Step Consists Of** Refer to Figure 2, "Equipment"

**2.210 Screening and Debrining**

- DSM Screen
- Vibrating Screen (Derrick)

**2.220 Separating**

- Tri-Flo Separator

**2.230 Debrining**

- Media Recovery Screen
- Dilute Media Pumpbox
- Media Pumpbox
- High Density Media Pump
- Low Density Media Pump

**2.240 Magnetite Recovery**

- Dilute Media Pump
- Cyclone Feed Pump
- Media Debrining Cyclone
- Magnetic Separator
- Effluent Pump

## 2.300 Where the Equipment is Located

Visits to the pilot plant are the only way to find all of the equipment. Do not be overly concerned with the flows and controls as they are covered in Section 3.000.

Pay particular attention to the safety hazards and make a list of potential safety concerns.

**Practice Assignment #1**

1. List the feed streams

   - 
   - 
   - 
   - 
   - 

   List the output streams

   - 
   - 
   - 
   - 
   - 

2. Draw a functional block diagram for this step.

3. List the pieces of equipment that make up each of the functional blocks.

Screening and Debrining

- 
- 

Separating

- 

Debrining

- 
- 
- 
- 
- 

Magnetite Recovery

- 
- 
- 
- 
- 

## 3.000 How the Heavy Media Separation Step Works (Refer to Figure 3 - 'Flows'

### 3.100 Separating

Deslimed and scrubbed flotation feedstock is gravity fed to a DSM screen from one of three sources:

- Scrubber Discharge
- Primary Insol Tailings
- Secondary Insol Tailings

The oversize from the DSM screen (-5 to +20 mesh) is fed to vibrating screen and its oversize (+20 mesh) gravity flows to the feed chute of the Tri-Flo separator. This screening and debrining removes as much moisture as possible in order to help maintain a "brine" balance in the pilot plant.

The undersize from the DSM screen and vibrating screen is returned to the flotation process.

The principle of operation of the separator is a process whereby ore particles of differing specific gravity and sizes can be separated by immersing them in a liquid or slurry (known as media) having a specific gravity between that of the particles being separated.

Referring to Figure 4, the feed enters the separator and a centrifugal action begins similar to that of a cyclone. The Tri-Flo separator, however, is designed to be more efficient and more wear resistant (i.e. involuted inlets). The discharge of one of the two stages feeds directly into the second stage, thus eliminating a set of pumps between the two separation stages which would be required if cyclones were used.

Media is injected into the separator to separate the feed into the right specific gravity range (1.80 to 2.10). Sink 1 from the first stage of separation contains the tails (approximately 2.10 and greater specific gravity). Sink 2 from the second stage of separation contains the middlings (approximately 2.035 specific gravity). The remaining float (approximately 1.80 specific gravity) travels through the separator and is discharged out the end and is expected to be at a final grade of 60.5% $K_2O$.

In a full plant installation, it would then go to the product centrifuges after debrining. The Sink 2 product would be reground to liberate locked potassium chloride values, deslimed and refloated in the existing flotation circuit. The Sink 1, or tails product, would be ground to a size which can be transported to the tailings pile and sent to the regrind circuit. Figure 5 details full plant installation.

In the case of this pilot project, the three streams will be recombined and returned to flotation.

## 3.200 Debrining

The Sink 1, Sink 2 and float pass over the media recovery screen. Although pictorally this is shown as three separate screens, the pilot plant uses a single screen with dividers in it to keep the three flow streams separated.

As the products (Sink 1, Sink 2, and F) pass over the first section of the screen, the media drains and is recovered in different sections of the media recovery pumpbox and pumped either back to the Tri-Flo separator or to the magnetite recovery circuit via the cyclone.

Bagged magnetite is added in the high density pumpbox, when necessary, to raise the specific gravity back up to the desired range (i.e. within the control range of the brine addition density control).

In the second section of the media recovery screen, the three products are washed with brine to recover the remaining magnetite (media) which is collected in the dilute media pumpbox.

In full plant operation only, the three products proceed to the following:

- Float to the product centrifuges
- Sink 1 to the regrind circuit.
- Sink 2 to crushing and then to the flotation circuit.
- For the pilot plant they will be recombined and sent to the deslime sump.

## 3.300 Magnetite Recovery

The under dense media from the cyclone feed portion of the media pumpbox is pumped to the media debrining cyclone where it is densified along with the dilute media. The dilute media results from the brine wash section of the screen which has been pumped separately to the magnetic separator. Here, a magnetic drum slowly rotates through the dilute media bath and the magnetite is recovered and scraped off to be returned to the main media pumpbox. The brine is then purged as effluent.

The amount of material from the main media pumpbox which may be treated in the magnetic separator sections depends upon the amount of wash brine being used on the wash section of the screen because of loading on the magnetic separator.

FOOTE MINERAL COMPANY

# MATERIAL SAFETY DATA SHEET



## SECTION I - PRODUCT IDENTIFICATION AND PHYSICAL DATA

CHEMICAL NAME: Ferrosilicon COMMON NAME: Silvery Iron

CHEMICAL FORMULA: FeSi (CAS: 8049-17-0) and Fe

APPEARANCE AND ODOR: Metallic silver solid. Odorless.

HAZARDOUS COMPONENTS OF MIXTURE: None

VAPOR PRESSURE: Effectively zero at 20°C MELTING POINT: 1200°C

FLASH POINT: No flash point FLAMMABLE LIMITS: Dust finer than minus 100 mesh can be flammable.

OTHER CHARACTERISTICS: Contains: 82% Iron (Fe), 18% Silicon (Si)

## SECTION II - FIRE, EXPLOSION, AND PHYSICAL HAZARD DATA

FIRE AND EXPLOSION HAZARDS: Based on combustibility test, dust can be ignited when suspended in air and will propagate flame but is not expected to generate sufficient pressure to explode.

REACTIVITY DATA: Can react with oxidizing materials and acids such as hydrofluoric acid.

EXTINGUISHING MEDIA: Dry powder, sand or water fog.

SPECIAL FIRE FIGHTING PROCEDURES: None

OTHER PHYSICAL HAZARDS: Small amounts of hydrogen may evolve if moisture is present.

## SECTION III - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up and return to container. Avoid repacking material which is wet in closed or sealed containers. Wear personal protective equipment when cleaning up spills.

WASTE DISPOSAL METHOD: Follow state and local regulations.

| | |
|---|---|
| DATE OF ISSUE 1/10/86 | REVIEWED BY W. E. Fanus |
| SUPERSEDES: 9/25/85 | TITLE Head of Analytical Chemistry |

**Practice Assignment #2**

1. Describe how each of the functional blocks work.

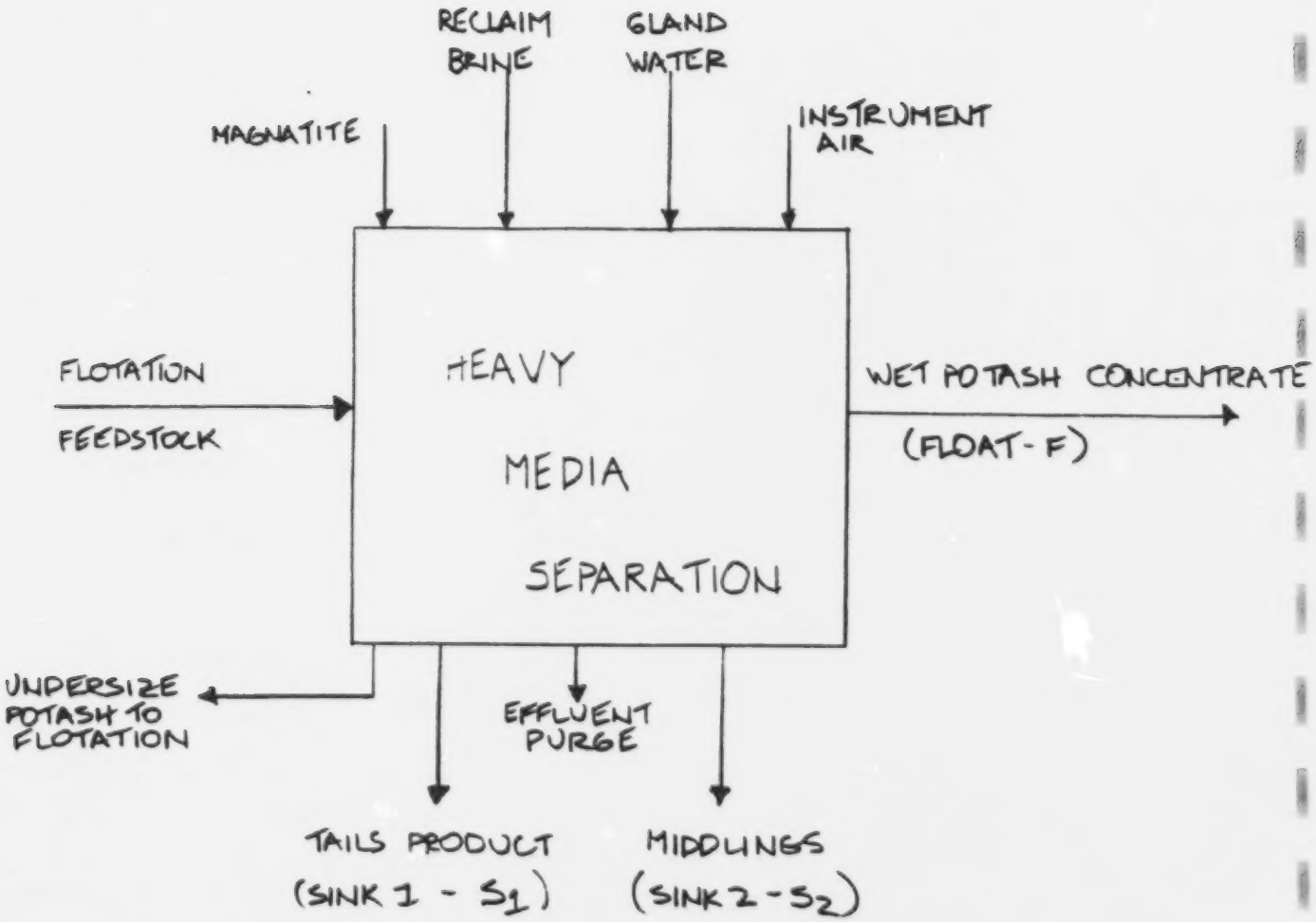



FIG 1A 'INPUT/OUTPUT DIAGRAM'

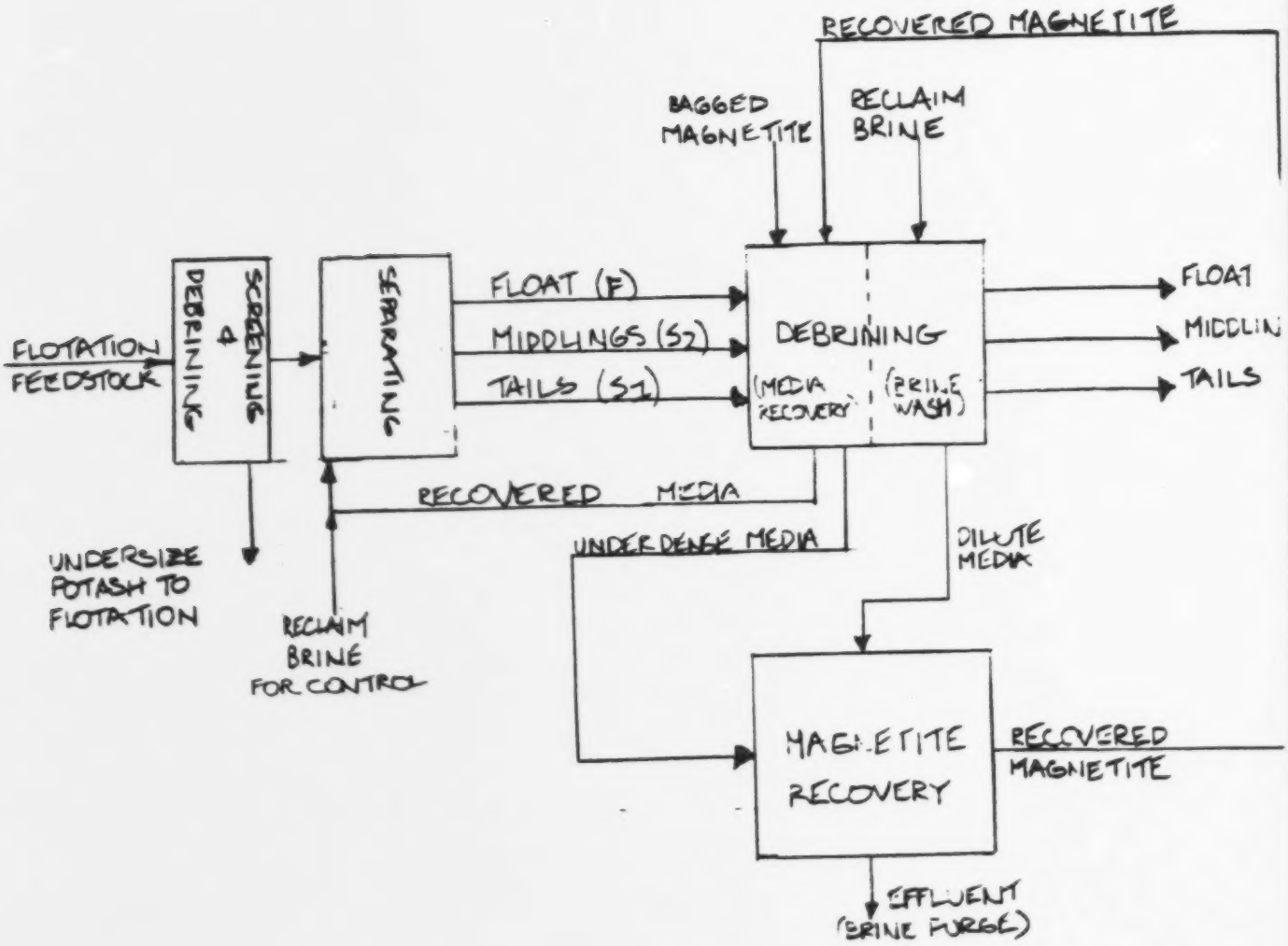



FIG.1B 'FUNCTIONAL BLOCK DIAGRAM'

1) DSM SCREEN
2) VIBRATING SCREEN
3) TRI-FLOW SEPARATOR
4) MEDIA RECOVERY SCREEN
5) DILUTE MEDIA TANK
6) MEDIA PUMPBOX
7) HIGH DENSITY MEDIA PUMPBOX
8) LOW DENSITY MEDIA PUMPBOX
9) CYCLONE FEEDPUMP
10) DILUTE MEDIA PUMP
11) MEDIA DEBRINING CYCLONE
12) MAGNETIC SEPARATOR
13) EFFLUENT PUMP

FIG. 2 'EQUIPMENT'

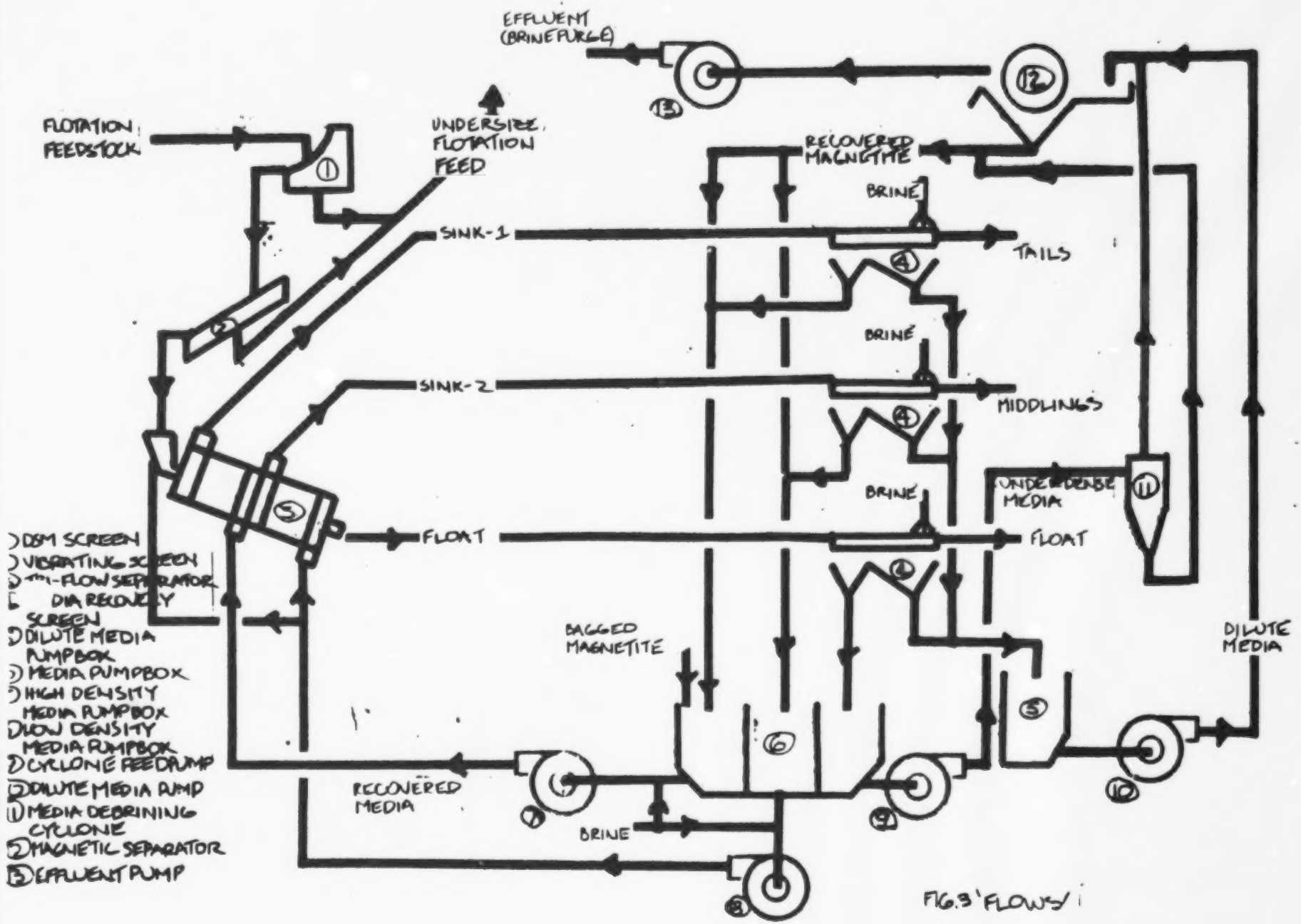
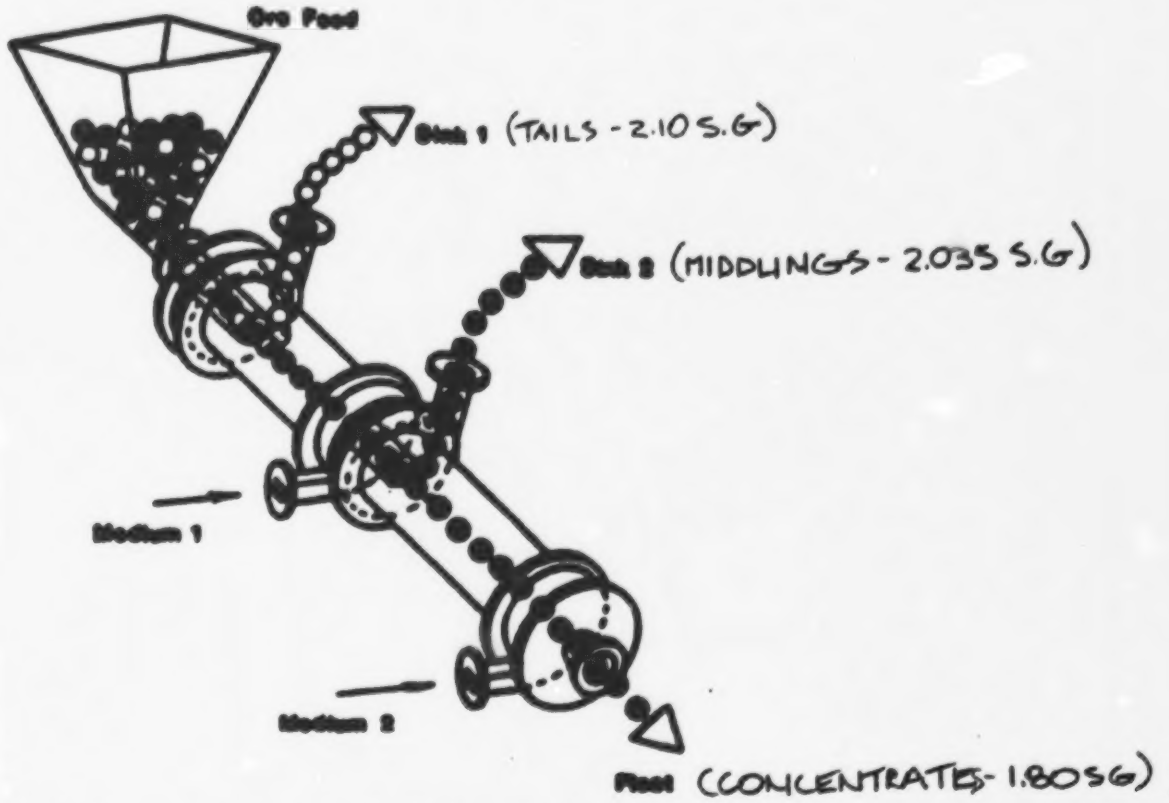



FIG.3 'FLOWSHEET'

**Triflow Separator**




**Note:** Drawing simplified - medium and sink connections are actually involutes.

FIG. 4 - 'TRI-FLOW SEPARATOR DETAIL'

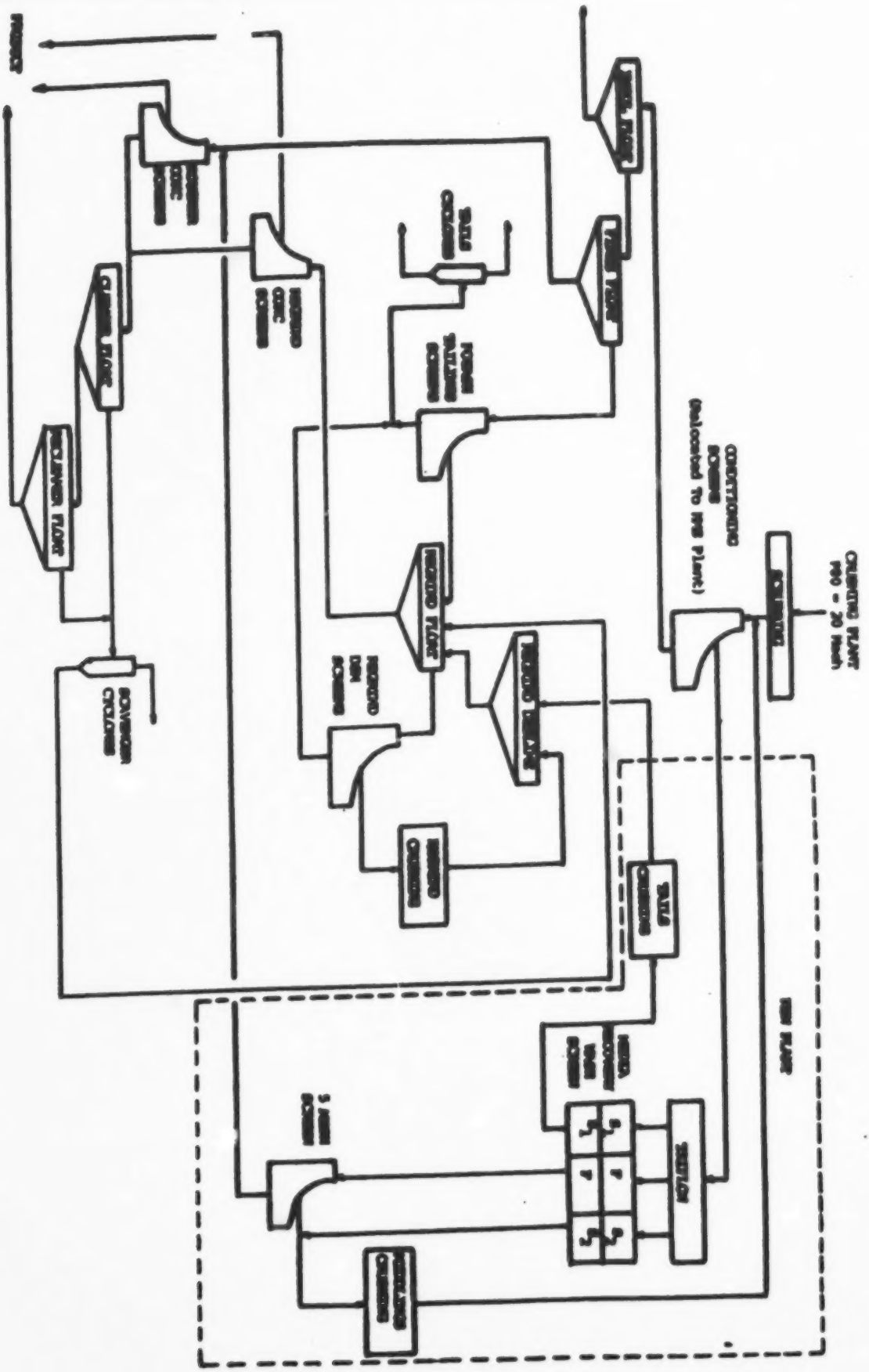


FIG 5. INCORPORATION OF HEAVY MEDIA CIRCUIT AT POTASH

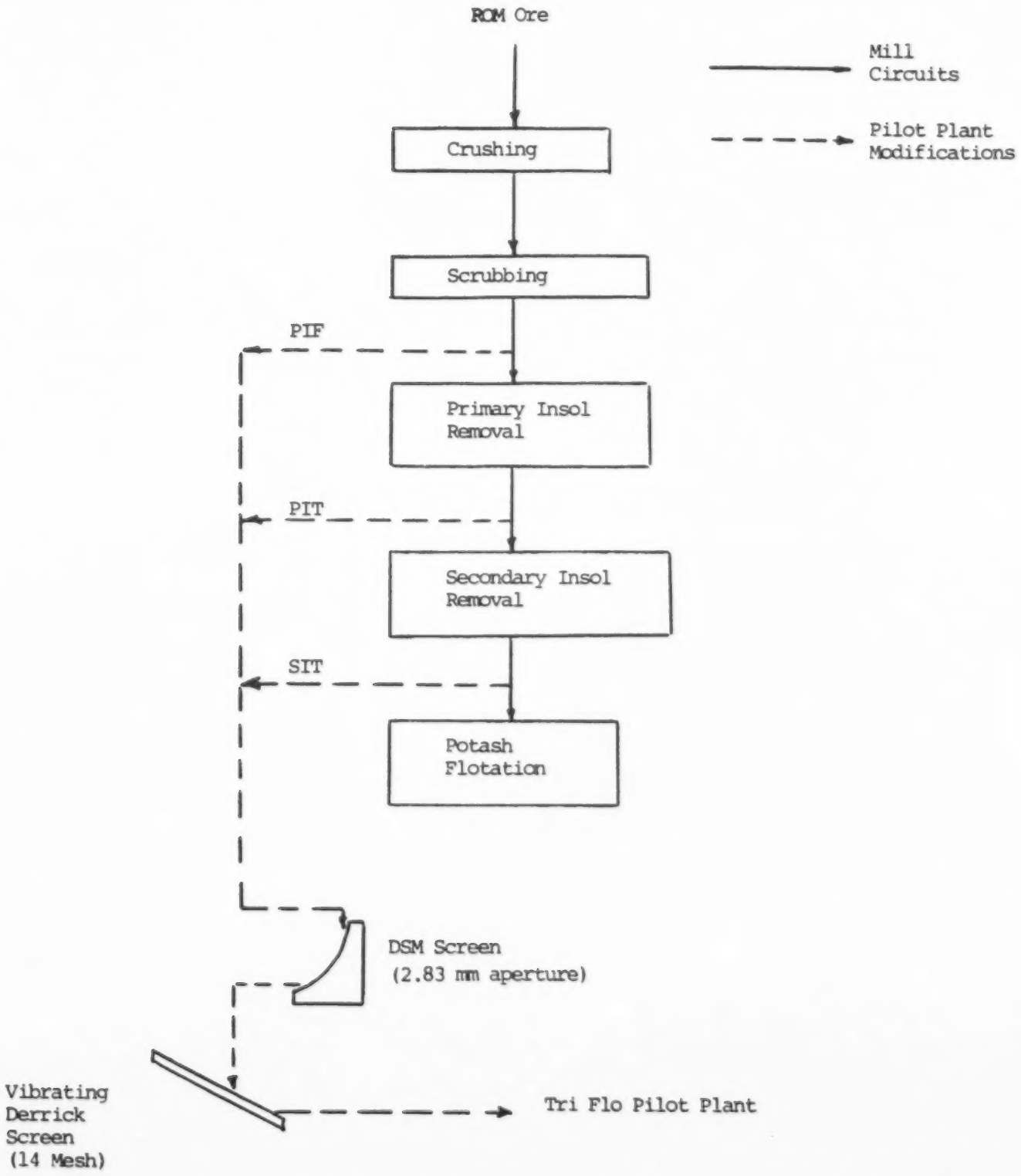
# APPENDIX 5

FIGURE A

TABLE I

TABLE II

Fig. A - Pilot Plant Feed Material Sources and Feed Preparation System.



## TABLES I & II

## TYPICAL TRI-FLO PILOT PLANT FEED DISTRIBUTIONS

### TABLE I

NORMAL SIZE FEED

#119 FEED SGN = 255

| +5 | +6 | +8 | +10 | +14 | +20 | +28 | +35 | +48 | +65 | +100 | +150 | +200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.5 | 15.2 | 59.0 | 81.6 | 93.1 | 97.0 | 98.6 | 99.2 | 99.5 | 99.6 | 99.7 | 99.8 | 99.8 |

### TABLE II

COARSE FEED

#138 SGN = 300

| +5 | +6 | +8 | +10 | +14 | +20 | +28 | +35 | +48 | +65 | +100 | +150 | +200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22.0 | 40.2 | 73.4 | 87.5 | 94.1 | 97.0 | 98.6 | 99.2 | 99.5 | 99.7 | 99.7 | 99.8 | 99.9 |

# APPENDIX 6

FOOTE MINERAL COMPANY
Route 100, Exton, Pennsylvania 19341 (215) 363-6500
Telex 835492
TWX 510-668-9142

January 1, 1984
Supersedes: April 1, 1982


# MAGNAFLOAT® (Magnetite)

## Specifications:

| | Chemical | Typical |
|---|---|---|
| Chemical Analysis: | Fe | 62.2 % |
| | $SiO_2$ | 1.5 |
| | $Al_2O_3$ | 3.5 |
| | S | 0.15 |
| | P | 0.012 |
| Magnetics | | 91.0 - 94.0 |

Screen Analysis:

| | Typical | | | |
|---|---|---|---|---|
| | +100 Mesh | +200 Mesh | +325 Mesh | -325 Mesh |
| Grade "A" | 0.6% | 12.0% | 17.8% | 69.6% |
| Grade "B" | 0.1 | 1.0 | 7.6 | 91.4 |
| Grade "C" | 5.0 | 22.0 | 23.0 | 50.0 |
| Grade "D" | 6.0 | 29.5 | 22.9 | 36.3 |
| Grade "E" | 0.1 | 0.4 | 1.9 | 97.7 |
| Grade "G" | 0.2 | 6.2 | 15.5 | 78.1 |

Packaging:

Standard Packaging - 100 pounds, net weight, paper bags.

Special Packaging - 50 pounds, net weight, paper bags available.

PRICE SUBJECT TO CHANGE WITHOUT NOTICE.

FOOTE MINERAL COMPANY

# MATERIAL SAFETY DATA SHEET



## SECTION I - PRODUCT IDENTIFICATION AND PHYSICAL DATA

CHEMICAL NAME: Iron Oxide COMMON NAME: Magnetite
Magnafloat

CHEMICAL FORMULA: $Fe_3O_4$ (CAS: 1309-38-2)

APPEARANCE AND ODOR: Dark red to black powder. Odorless.

HAZARDOUS COMPONENTS OF MIXTURE: Iron Oxide is a mixture with the following components:

| | | |
|---|---|---|
| $Fe_3O_4$ | 82-92% | |
| $SiO_2$ | 0- 7% | (CAS: 14808-60-7) |
| $TiO_2$ | 0-10% | (CAS: 13463-67-7) |
| $Al_2O_3$ | 0- 5% | (CAS: 1344-28-1) |

VAPOR PRESSURE: Effectively zero at 20°C
FLASH POINT: No Flash Point. FLAMMABLE LIMITS: Not Flammable.
OTHER CHARACTERISTICS: None.

## SECTION II - FIRE, EXPLOSION, AND PHYSICAL HAZARD DATA

FIRE AND EXPLOSION HAZARDS: Not Flammable.

REACTIVITY DATA: Stable Material.

EXTINGUISHING MEDIA: Not Flammable.

SPECIAL FIRE FIGHTING PROCEDURES: Not Flammable.

OTHER PHYSICAL HAZARDS: None.

## SECTION III - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up and return to container. Wear personal protection when cleaning up spills.

WASTE DISPOSAL METHOD: Follow state and local regulations.

| | |
|---|---|
| DATE OF ISSUE: 7/25/85 | REVIEWED BY: W. E. Fanus |
| SUPERSEDES: 8/16/84 | TITLE: Head of Analytical Chemistry |

## SECTION IV - HEALTH HAZARD DATA

EXPOSURE LIMIT VALUE(S): OSHA limits exposure to the components of iron oxide as follows: $Fe_3O_4$, Iron oxide, 5mg/$m^3$ TWA
$SiO_2$, Silica, 0.3mg/$m^3$ TWA total dust
$Al_2O_3$, Alumina, 10mg/$m^3$ TWA
$TiO_2$, Titanium dioxide, 5mg/$m^3$ TWA

PRIMARY ROUTE(S) OF EXPOSURE: Inhalation.

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Shortness of breath or dry cough are the first signs of overexposure. If such symptoms occur, remove from exposure and seek medical attention.

EFFECTS OF OVEREXPOSURE: Years of overexposure to iron oxide or silica dust may result in irritation of the respiratory track causing shortness of breath, fatigue, loss of appetite and incapacity to work.

POTENTIAL FOR CARCINOGENICITY: Iron oxide is not listed as a carginogen or potential carcinogen by the National Toxicology Program of the U.S. Public Health Service, nor has it been found to be a carcinogen or potential carcinogen by OSHA or the International Agency for Research on Cancer. Foote is not aware of any data indicating that iron oxide produces cancer.

EMERGENCY/FIRST AID PROCEDURES:

On contact with skin, practice proper hygiene.

On contact with eyes, flush eyes thoroughly with potable water for 15 minutes.

On inhalation, if respiratory distress persists, seek medical attention.

## SECTION V - SPECIAL PROTECTION AND PRECAUTIONS

VENTILATION AND ENGINEERING CONTROLS: Engineering controls (e.g. mechanical exhaust) should be in place in order to ensure that employee exposures to magnetite/magnafloat do not exceed 0.3mg/$m^3$ TWA as silica dust.

PERSONAL PROTECTIVE EQUIPMENT: Under conditions in which magnetite/magnafloat dust levels exceed permissible exposure limits, NIOSH - approved dust respirators and dust goggles should be worn.

SAFE HANDLING, USE AND STORAGE: No special handling or storage.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE: Wear personal protective equipment during clean up and repairs.

OTHER: None.

ADDITIONAL INFORMATION REGARDING THIS MATERIAL AND APPROPRIATE EMERGENCY PROCEDURES MAY BE OBTAINED FROM:

FOOTE SALES REPRESENTATIVE

Foote Mineral Company
Route 100, Exton, PA 19341
(215) 363-6500

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## SECTION IV - HEALTH HAZARD DATA

EXPOSURE LIMIT VALUE(S): If employee exposure is limited to 5mg/$m^3$, the ACGIH nuisance dust limit, then all OSHA and TLV limits for the components of ferrosilicon will be in compliance.

PRIMARY ROUTE(S) OF EXPOSURE: Inhalation.

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Shortness of breath or dry cough are the first signs of overexposure. If such symptoms occur, remove from exposure and seek medical attention.

EFFECTS OF OVEREXPOSURE: If the recommended dust exposure limits are not exceeded a worker will not experience any lung or breathing problems from working with ferrosilicon. If recommended limits are consistently exceeded the person can experience irritation of the respiratory tract, shortness of breath, fatigue, loss of appetite and incapacity to work. Foote believes there are not health hazards from working with ferrosilicon in lump form.

POTENTIAL FOR CARCINOGENICITY: Ferrosilicon is not listed as a carcinogen or potential carcinogen by the National Toxicology Program of the U.S. Public Health Service, nor has it been found to be a carcinogen or potential carcinogen by OSHA or the International Agency for Research for Cancer. Foote is not aware of any data indicating that ferrosilicon produces cancer.

EMERGENCY/FIRST AID PROCEDURES:

On contact with skin, practice proper hygiene.

On contact with eyes, flush eyes thoroughly with potable water for 15 minutes.

On inhalation, if respiratory distress persists, seek medical attention.

## SECTION V - SPECIAL PROTECTION AND PRECAUTIONS

VENTILATION AND ENGINEERING CONTROLS: Engineering controls (e.g., mechanical exhaust) should be in place in order to ensure that employee exposures to ferrosilicon dust do not exceed $5mg/m^3$, the ACGIH limit for nuisance dust.

PERSONAL PROTECTIVE EQUIPMENT: Under conditions in which ferrosilicon dust levels exceed $5mg/m^3$, NIOSH-approved dust respirators should be worn. Dust goggles help prevent eye irritation. Gloves are required as metal may have sharp edges.

SAFE HANDLING, USE AND STORAGE: No special precautions for lump material. An inert atmosphere is recommended for powders with more than 50% minus 325 mesh.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE: Clean fine dust from equipment before beginning repairs. Wear personal protective equipment to avoid inhalation of dust and gloves to avoid cuts from metal with sharp edges.

OTHER: None

ADDITIONAL INFORMATION REGARDING THIS MATERIAL AND APPROPRIATE EMERGENCY PROCEDURES MAY BE OBTAINED FROM:

FOOTE SALES REPRESENTATIVE

Foote Mineral Company
Route 100, Exton, PA 19341
(215) 363-6500

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# technical data

FOOTE MINERAL COMPANY / Ferroalloys Division
Route 100 / Exton, Pa. 19341 / (215) 363-6500

# PULVERIZED SILVERY PIG IRON

Foote pulverized silvery pig iron is designed specifically for use in the heavy media separation process. The most common application of this process is in the beneficiation of certain ores and minerals. A recent development involves the separation of mixtures of light and heavy nonferrous metals which have been recovered from junked car bodies and other scrap sources.

This high grade silvery pig iron contains 15% silicon and is furnished in a variety of sizes from 50 mesh x down to 200 mesh x down.

## PRODUCT DESCRIPTION

**Typical Chemical Composition**

| Si | C | Mn | Balance |
|---|---|---|---|
| 15.01 – 15.50% | .80% | 1.00% | high grade iron |

**Standard Sizes** (U.S. Sieve Series)

50 mesh x down
70 mesh x down
100 mesh x down
200 mesh x down
150 mesh x down
270 mesh x down
325 mesh x down

**Specific Gravity:** 7.0 g/cc

## ADDITIONAL INFORMATION

**Packaging:** Steel drums, approximately 500 lbs. net weight, each. Drums on pallets are also available.

**Storage:** Dry covered storage recommended.

**Magnetic Properties:** 97% minimum magnetics

**Oxidation Control:** Maintain wet media at pH above 10.0 and temperature below 30°C.

# PULVERIZED SILVERY PIG IRON / Technical Data Bulletin 215

## APPLICATION INFORMATION

Beneficiation via heavy media separation is a process in which a mechanical mixture of heavy and light materials may be separated into two or more fractions by a sink-float technique. The materials to be separated are fed into a specially designed vessel containing a suspension of pulverized silvery pig iron in water. Since the specific gravity of water is 1.0 and that of pulverized silvery pig iron is about 7.0, a heavy solution of water and pulverized silvery pig can be made up to a practical operating Sp.G. of about 3.0 to 3.5.

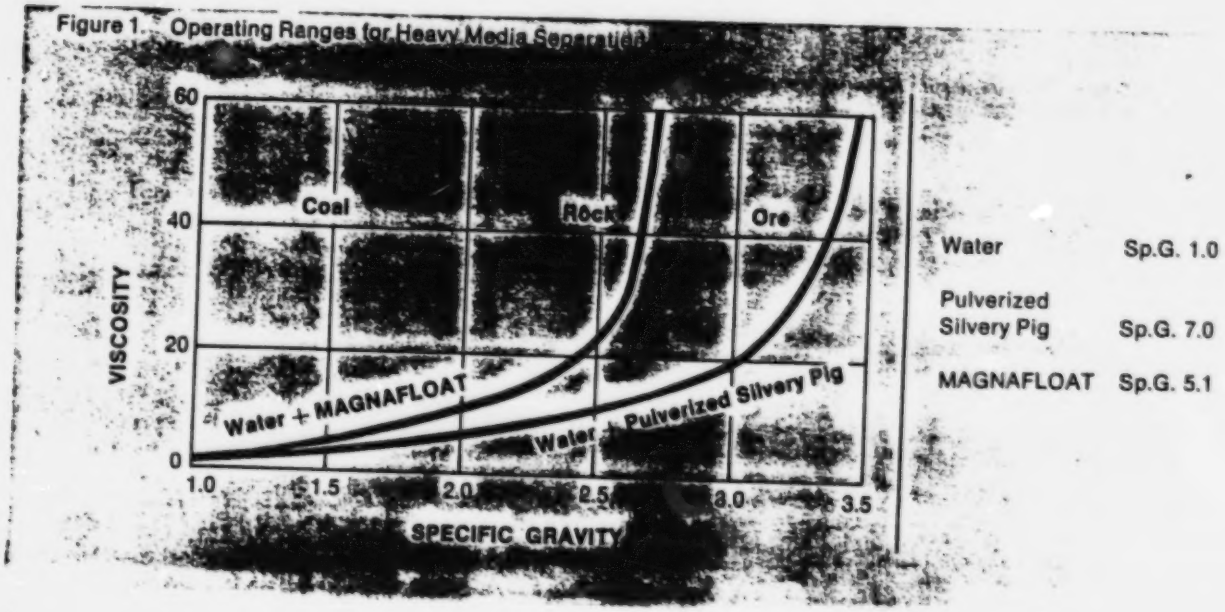
As a general operating procedure, water and Foote's ground Magnetite, MAGNAFLOAT*, are used to yield separating solutions of Sp.G. 1.3-2.5; a mixture of water, MAGNAFLOAT and pulverized silvery pig iron is often used in the intermediate range of 2.2 to 2.9; while a mixture of only silvery pig iron and water may be used in the ranges of 2.5 to 3.5.

Referring to Figure 1, general operating ranges show that a mixture of MAGNAFLOAT and water can be used up to a Sp.G. of about 2.5, at which point the solution becomes too viscous for practical use. A mixture of pulverized silvery pig iron and water can be used up to a Sp.G. of about 3.5 depending upon media size and solution viscosity.

There are established operating areas for specific types of heavy media separation. At a Sp.G. of about 1.5, bituminous coal can be separated from slate using a mixture of MAGNAFLOAT and water as the medium. The coal floats off in the separating vessel. At a Sp.G. of about 2.6, light and heavy concrete aggregate rock may be separated using a mixture of MAGNAFLOAT, pulverized silvery pig iron and water as the medium. At a Sp.G. of about 3.2, iron ore can be separated from waste rock using a mixture of pulverized silvery pig iron and water as the heavy medium. In this case, iron ore sinks to the bottom of the vessel.

* Consult Foote's Chemical and Mineral Products Division for details on MAGNAFLOAT iron dioxide concentrate.

Figure 1. Operating Ranges for Heavy Media Separation




**NOTICE**

The opinions, findings and recommendations set forth in this booklet concerning the performance or use of the products or techniques herein described are based on our research and general experience. While we believe this information to be accurate and reliable, we do not guarantee accuracy or the results to be obtained in any particular application. It is understood that you will rely on your own tests to determine the suitability of such techniques or products for your own particular purpose. We warrant that the products referred to herein will conform to specifications, and we agree to replace any defective products. However, we do not assume liability for any incidental or consequential damages. NOTHING HEREIN SHALL CREATE A WARRANTY OF MERCHANTABILITY OR A WARRANTY THAT THE PRODUCT IS FIT FOR ANY PARTICULAR PURPOSE UNDER THE UNIFORM COMMERCIAL CODE.

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# APPENDIX 7

The Test Program Schedule was conducted as follows:

Nov. 02-06 Equipment Testing / Debugging / Charging Media

Nov. 09-17 Outokumpu and Impromin representatives were on site to assist in start-up and establish operating parameters, calibration of density meters, preliminary testwork. The need to add Ferrosilicon to Grade G magnetite to give satisfactory separations was established.

Nov. 19-27 8 hour runs to establish grade/recovery performance of three feed materials with varying insoluble levels under different operating conditions to determine the best material for potential treatment.

Dec. 30-04 Continuous operation (24 hours a day) on PIF feed material to study effects of ore variation, ability to maintain separation densities, media deterioration and feed size distribution.

Dec. 07-10 Follow up testwork including operation with only Grade G magnetite as media on 8 hours/day operation basis.

Thee feed materials of differing insol content were tested in the pilot plant campaign. These were the primary insol feed (PIF), primary insol tail (PIT) and secondary insol tail (SIT) as described in Section 4.2 DATA.

Each of the three feed materials was fed through to the feed preparation system to remove -14 mesh material.

Referring to Figure A in Appendix 5, the slurry was first directed over a 2.83 mm aperture DSM screen to remove the majority of the -14 mesh material. The +14 mesh material was then passed over a Derrick vibrating screen to debrine and further remove the -14 mesh material from the wet feed to the pilot plant. The debrining was particularly important as the media recovery from the purge stream of the pilot plant governed the operating rate of the pilot plant.

The undersize from both screens was returned to the mill circuits.The Derrick screen oversize dropped by gravity into the feed hopper for the Tri-Flo separator. Tables I and II Appendix 5 give typical screen analysis of both the normal size feed and the coarser size feed used in the testwork.

# APPENDIX C

# HEAVY MEDIA SEPARATION OF POTASH ORE

## PHASE II

## PROGRESS REPORT III

# PROJECT PROGRESS REPORT

# HEAVY MEDIA SEPARATION OF POTASH ORE - PHASE II

## 1.0 INTRODUCTION

The following is the third Progress Report on Phase II of the Heavy Media Separation Project. It covers testwork conducted in the period January - March, 1988, at Cominco Fertilizers Potash Operations.

This testwork includes laboratory testwork recommended in the second progress report.

## 2.0 SUMMARY AND CONCLUSIONS

i) The traditional measure of Heavy Media Separation efficiency, Ep, generally ranges from .02 to 0.6[1]. As indicated by the results in Figure 1 and Table 1 separations obtained in this testwork were very good, with Ep's between .015 - .030.

ii) These results also indicate that there is little, if any, difference in separation performance between the three different materials tested. Any differences are likely due to ore variations or variations in the testwork rather than degree of pretreatment.

iii) Size fraction anaylsis of the samples indicate that a smaller percentage of the mesh, material reports to the concentrate when a coarse feed material was tested. Efficiency curves indicate similar separation performance for all size fractions hence indicating a ore liberation problem, rather than a separation problem at these particle sizes.

The +6 mesh material, as a percentage of the total concentrate weight was much higher in the coarse feed testwork and this more than compensates for the smaller recoveries obtained.

## 3.0 DETAILS

### 3.1 PURPOSE

Testwork conducted in the time period of this report had the following objectives:

i) To establish partition coefficients and overall separation efficiencies for selected tests from the continuous Tri-Flo pilot plant work reported in Progress Report II.

ii) To confirm by laboratory separation, the equivalency of performance of the different feed materials with varying levels of insolubles removal.

iii) To determine if the performance of the Tri-Flo unit on the coarser feed was due to ore liberation separation efficiency at the larger particle sizes.

### 3.2 PROCEDURE

Four sets of samples were selected from the 134 sets obtained in the continuous Tri-Flo pilot campaign at Cominco. *

These sets were from tests #36, 72, 123 and 135.

Tests #36, 72 and 123 represented each of the three different products during the program; those being PIT, PIF, and SIT respectively.[t] The 4th set of samples was obtained while running a coarser than normal PIF material through the pilot plant.

These four sample sets were selected for further analysis based on grade/recovery results which most closely represented the most desirable results.

Each of the three products (F, $S_2$, $S_1$) from each of the four sample sets was separated into specific gravity fractions between the range of 1.99 - 2.2 and then subsequently split into three size fractions: +6 mesh; -6 +10 mesh' -10 mesh.

From these results, Tromp separation efficiency curves were generated and particle size/recovery information generated.

### 3.3 DATA AND RESULTS

Figure 4 in Appendix 1 compares the separation curves obtained for the float products in each of the selected sample sets. (Tests 36, 72, 123, 135).

## 3.0 DETAILS - (continued)

### 3.3 DATA AND RESULTS - (continued)

Though there appears to be some variation in partition coefficients amongst the samples, this is most likely due to variations in test conditions and or ore characteristics as the set showing the best recoveries at a given fluid density was obtained using the material which had undergone the least pretreatment.

Traditional measures of Heavy Media Separation efficiency, Ep, generally range from .02 to .06 [1]. Table 1 shows the values obtained for those tests as well as the method of calculation. Ep values calculated indicate that very good separations can be obtained.

Ep curves were also generated for each of the three size fractions into which the samples were divided: -6 -10 mesh and -10 mesh. Graphs 2-4 show these results. The different size fractions for the most part appear the behave similarly to the composite sample. Inconsistances likely result from inaccuracies resulting from small sample sizes in the screen fraction work.

Finally Table 2 is Appendix 3 gives a summary of the +6 mesh particle distribution in the three products (F, $S_2$, $S_1$) resulting from the 4 selected tests.

This size fraction analysis indicates that a smaller percentage of the +6 mesh material is recovered in the coarser primary insol feed (PIF) tests and this is combination with the results from the efficiency curves which show no decrease in separation efficiency in the +6 mesh size fraction, indicates that this smaller percentage is due to liberation rather than efficiency problems at these sizes.

However, the overall recovery of the +6 mesh material to the concentrate (ie. % of +6 mesh) is better in the coarse PIF tests and this more than compensates for the lower percentage reporting to concentrate.

# APPENDIX 1

TABLE 1

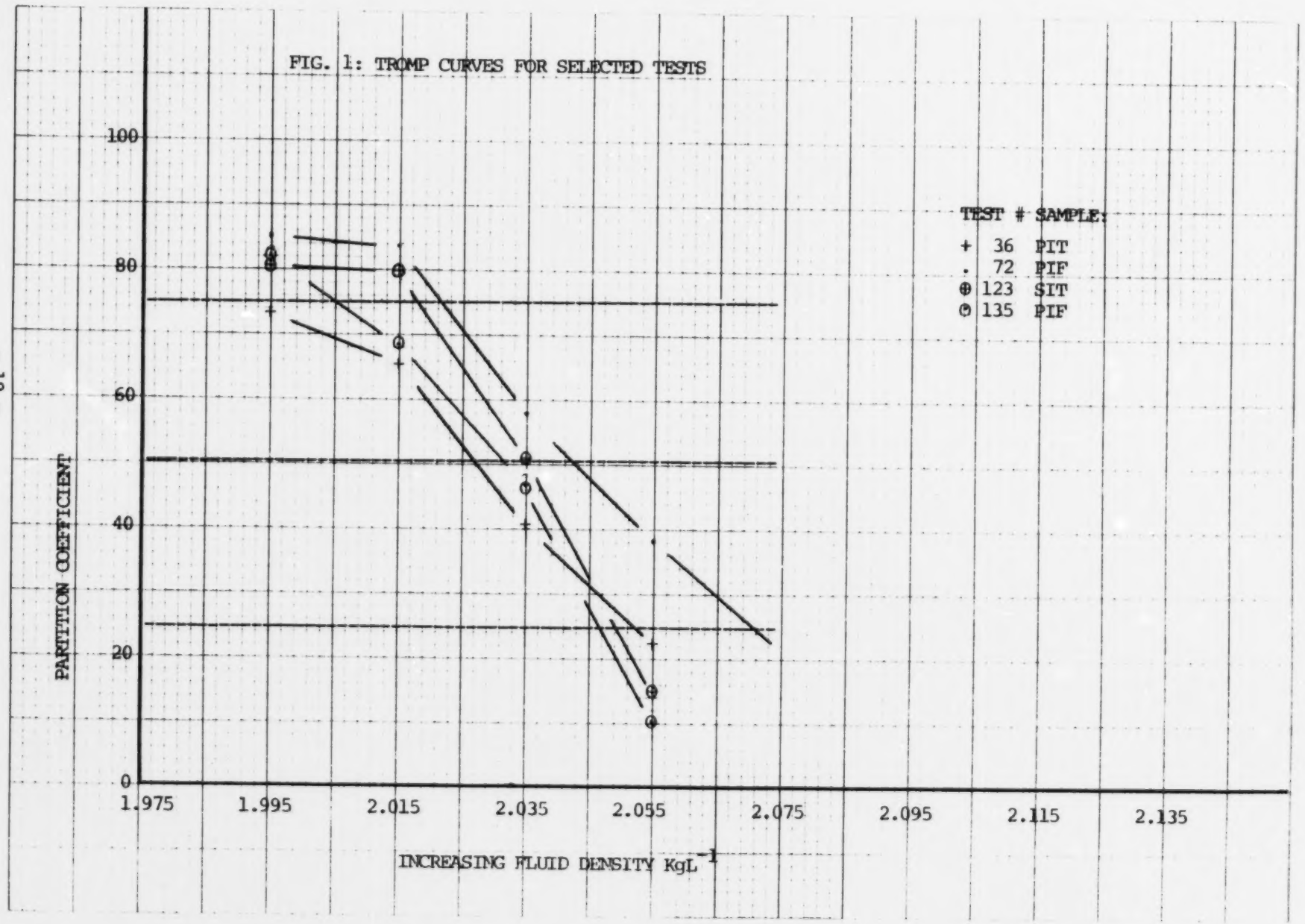
**SEPARATION EFFICIENCIES, Ep, FOR SELECTED TESTS**

| TEST # | SAMPLE | Ep * |
|---|---|---|
| 36 | PIT $^{t}$ | .030 |
| 72 | PIF $^{t}$ | .020 |
| 123 | SIT $^{t}$ | .0155 |
| 135 | PIF $^{t}$ (Coarse) | .0205 |

* Ep = 0.5 (T25 - T75)

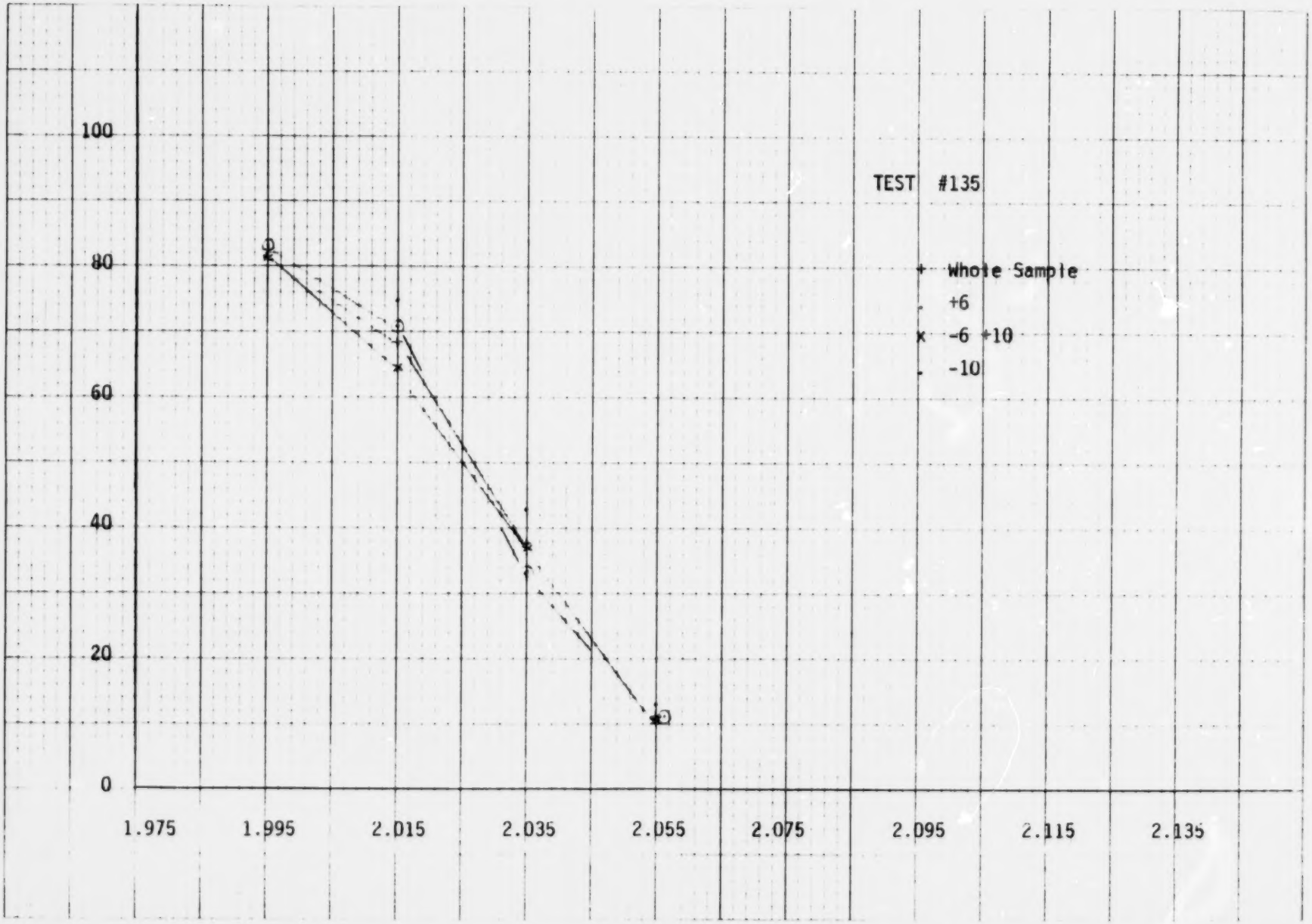
Ep, the Echart probability moyen, is determined from the Tromp Curve (See Figure 4) and is defined as half of the differential in density between the 25% and 75% partition coefficient on the distribution curve.

FIG. 1: TROMP CURVES FOR SELECTED TESTS

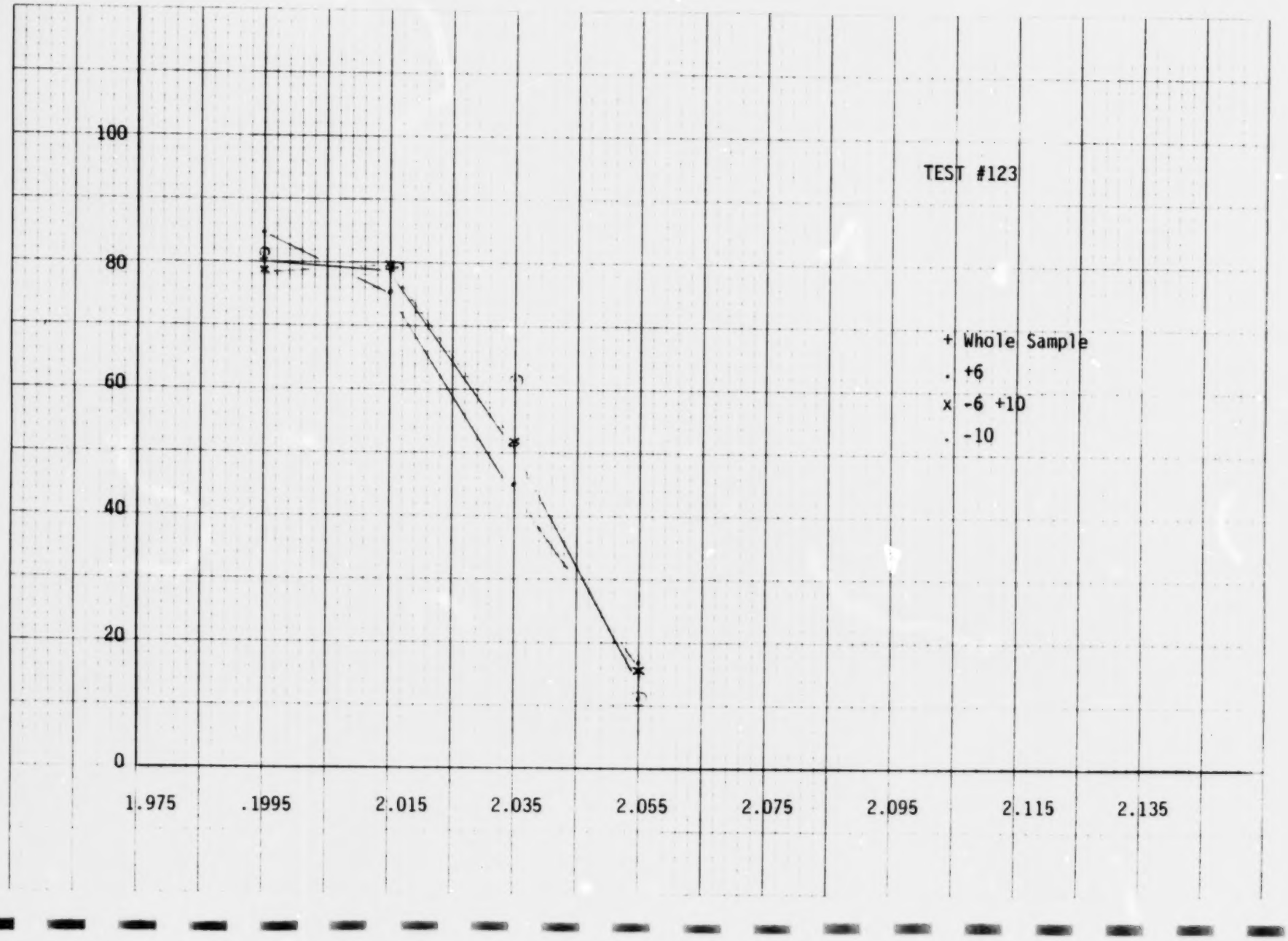


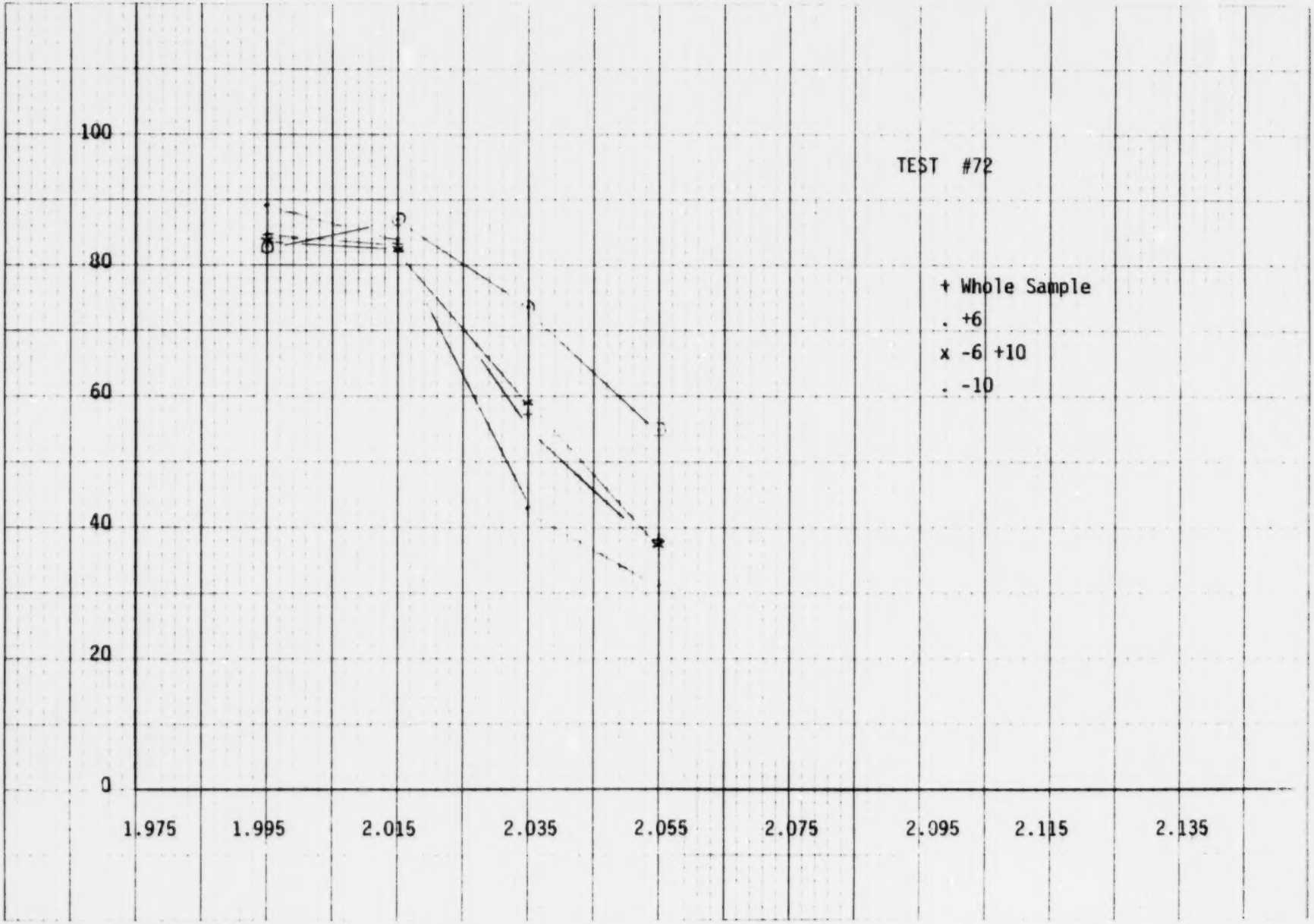
# APPENDIX 2

10 Squares to the Inch

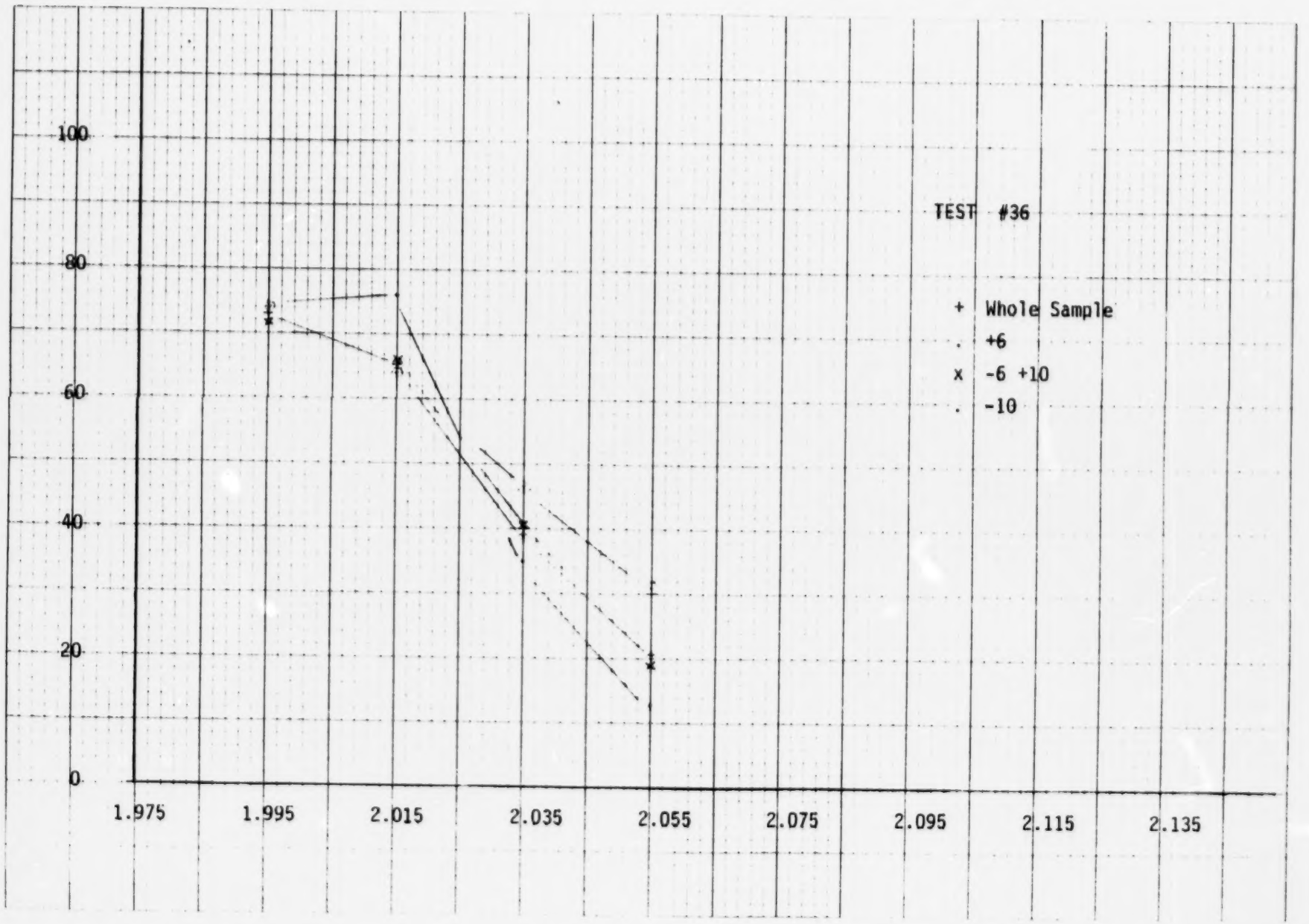


10 Squares to the Inch




TEST #72
+ Whole Sample
. +6
x -6 +10
. -10
100
80
60
40
20
0
1.975
1.995
2.015
2.035
2.055
2.075
2.095
2.115
2.135

10 Squares to the Inch



COARSE PIF

TEST 0 135

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 21.4 |
| S2 | 27.6 |
| S1 | 51.0 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 416.2 | 64.2 | 72.6 | 10.8 | 0.0 | 0.0 | 13.7 | 3.0 | 0.0 | 16.7 | 82.2 | 17.8 | 0.0 |
| 2.01 | 177.7 | 27.4 | 66.2 | 9.8 | 0.0 | 0.0 | 5.9 | 2.7 | 0.0 | 8.6 | 68.4 | 31.6 | 0.0 |
| 2.03 | 29.1 | 4.5 | 38.7 | 5.7 | 0.0 | 0.0 | 1.0 | 1.6 | 0.0 | 2.5 | 37.8 | 62.2 | 0.0 |
| 2.05 | 12.0 | 1.8 | 58.4 | 8.7 | 9.8 | 1.4 | 0.4 | 2.4 | 0.7 | 3.5 | 11.4 | 68.7 | 19.9 |
| 2.07 | 13.7 | 2.1 | 47.3 | 7.0 | 7.9 | 1.1 | 0.5 | 1.9 | 0.6 | 2.9 | 15.3 | 65.7 | 19.0 |
| 2.09 | | | 50.1 | 7.4 | 12.0 | 1.7 | 0.0 | 2.1 | 0.9 | 2.9 | 0.0 | 70.7 | 29.3 |
| 2.11 | | | 24.8 | 3.7 | 24.9 | 3.5 | 0.0 | 1.0 | 1.8 | 2.8 | 0.0 | 36.5 | 63.5 |
| 2.13 | | | 29.5 | 4.4 | 42.8 | 5.9 | 0.0 | 1.2 | 3.0 | 4.2 | 0.0 | 28.5 | 71.5 |
| 2.15 | | | 53.5 | 7.9 | 95.0 | 13.2 | 0.0 | 2.2 | 6.7 | 8.9 | 0.0 | 24.6 | 75.4 |
| 2.17 | | | 182.0 | 27.0 | 366.3 | 50.9 | 0.0 | 7.5 | 25.9 | 33.4 | 0.0 | 22.3 | 77.7 |
| 2.20 | | | 28.6 | 4.2 | 75.6 | 10.5 | 0.0 | 1.2 | 5.4 | 6.5 | 0.0 | 17.9 | 82.1 |
| -2.20 | | | 21.7 | 3.2 | 85.5 | 11.9 | 0.0 | 0.9 | 6.1 | 6.9 | 0.0 | 12.8 | 87.2 |
| | 648.7 | 100.0 | 673.4 | 100.0 | 719.8 | 100.0 | | | | | | | |

COARSE PIF

TEST # 135 +6 MESH MATERIAL

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 21.4 |
| S2 | 27.6 |
| S1 | 51.0 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | RECOVERY TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 95.7 | 55.0 | 21.4 | 9.1 | 0.0 | 0.0 | 11.8 | 2.5 | 0.0 | 14.3 | 82.4 | 17.6 | 0.0 |
| 2.01 | 59.4 | 34.1 | 20.5 | 8.8 | 0.0 | 0.0 | 7.3 | 2.4 | 0.0 | 9.7 | 75.2 | 24.8 | 0.0 |
| 2.03 | 10.8 | 6.2 | 15.8 | 6.7 | 0.0 | 0.0 | 1.3 | 1.9 | 0.0 | 3.2 | 41.7 | 58.3 | 0.0 |
| 2.05 | 4.4 | 2.5 | 27.1 | 11.6 | 3.7 | 1.1 | 0.5 | 3.2 | 0.6 | 4.3 | 12.6 | 74.2 | 13.2 |
| 2.07 | 3.7 | 2.1 | 22.4 | 9.6 | 4.7 | 1.4 | 0.5 | 2.6 | 0.7 | 3.8 | 12.0 | 69.2 | 18.9 |
| 2.09 | 0.0 | | 23.3 | 9.9 | 8.1 | 2.4 | 0.0 | 2.7 | 1.2 | 4.0 | 0.0 | 68.9 | 31.1 |
| 2.11 | 0.0 | | 11.5 | 4.9 | 17.6 | 5.3 | 0.0 | 1.4 | 2.7 | 4.0 | 0.0 | 33.5 | 66.5 |
| 2.13 | 0.0 | | 12.3 | 5.3 | 29.0 | 8.7 | 0.0 | 1.4 | 4.4 | 5.9 | 0.0 | 24.6 | 75.4 |
| 2.15 | 0.0 | | 19.2 | 8.2 | 55.0 | 16.5 | 0.0 | 2.3 | 8.4 | 10.7 | 0.0 | 21.2 | 78.8 |
| 2.17 | 0.0 | | 47.4 | 20.2 | 142.2 | 42.6 | 0.0 | 5.6 | 21.7 | 27.3 | 0.0 | 20.4 | 79.6 |
| 2.20 | 0.0 | | 8.2 | 3.5 | 34.2 | 10.3 | 0.0 | 1.0 | 5.2 | 6.2 | 0.0 | 15.6 | 84.4 |
| -2.20 | 0.0 | | 5.1 | 2.2 | 39.0 | 11.7 | 0.0 | 0.6 | 6.0 | 6.6 | 0.0 | 9.2 | 90.8 |
| | 174.0 | 100.0 | 234.2 | 100.0 | 333.5 | 100.0 | | | | | | | |

COARSE PIF

TEST # 135 -6 +10 MESH MATERIAL

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 21.4 |
| S2 | 27.6 |
| S1 | 51.0 |

| S6 FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 258.6 | 67.5 | 43.0 | 11.9 | 0.0 | 0.0 | 14.5 | 3.3 | 0.0 | 17.8 | 81.5 | 18.5 | 0.0 |
| 2.01 | 96.6 | 25.2 | 39.6 | 11.0 | 0.0 | 0.0 | 5.4 | 3.0 | 0.0 | 8.4 | 64.1 | 35.9 | 0.0 |
| 2.03 | 16.3 | 4.3 | 20.3 | 5.6 | 0.0 | 0.0 | 0.9 | 1.6 | 0.0 | 2.5 | 37.0 | 63.0 | 0.0 |
| 2.05 | 6.3 | 1.6 | 28.3 | 7.8 | 5.3 | 1.5 | 0.4 | 2.2 | 0.8 | 3.3 | 10.8 | 66.1 | 23.2 |
| 2.07 | 5.2 | 1.4 | 22.3 | 6.2 | 3.0 | 0.8 | 0.3 | 1.7 | 0.4 | 2.4 | 12.0 | 70.3 | 17.7 |
| 2.09 | 0.0 | | 23.8 | 6.6 | 3.9 | 1.1 | 0.0 | 1.8 | 0.6 | 2.4 | 0.0 | 76.5 | 23.5 |
| 2.11 | 0.0 | | 12.1 | 3.4 | 6.9 | 1.9 | 0.0 | 0.9 | 1.0 | 1.9 | 0.0 | 48.4 | 51.6 |
| 2.13 | 0.0 | | 15.1 | 4.2 | 13.1 | 3.7 | 0.0 | 1.2 | 1.9 | 3.0 | 0.0 | 38.1 | 61.9 |
| 2.15 | 0.0 | | 27.3 | 7.6 | 38.0 | 10.7 | 0.0 | 2.1 | 5.4 | 7.5 | 0.0 | 27.7 | 72.3 |
| 2.17 | 0.0 | | 102.0 | 28.3 | 207.9 | 58.3 | 0.0 | 7.8 | 29.7 | 37.5 | 0.0 | 20.8 | 79.2 |
| 2.20 | 0.0 | | 15.5 | 4.3 | 38.2 | 10.7 | 0.0 | 1.2 | 5.5 | 6.7 | 0.0 | 17.8 | 82.2 |
| -2.20 | 0.0 | | 11.3 | 3.1 | 40.1 | 11.3 | 0.0 | 0.9 | 5.7 | 6.6 | 0.0 | 13.1 | 86.9 |
| | 383.0 | 100.0 | 360.6 | 100.0 | 356.4 | 100.0 | | | | | | | |

COARSE PIF
TEST # 135 -10 MESH MATERIAL

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 21.4 |
| S2 | 27.6 |
| S1 | 51.0 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 61.9 | 67.6 | 8.1 | 10.5 | 0.0 | 0.0 | 14.5 | 2.9 | 0.0 | 17.4 | 83.3 | 16.7 | 0.0 |
| 2.01 | 21.7 | 23.7 | 6.0 | 7.8 | 0.0 | 0.0 | 5.1 | 2.1 | 0.0 | 7.2 | 70.3 | 29.7 | 0.0 |
| 2.03 | 2.1 | 2.3 | 2.7 | 3.5 | 0.0 | 0.0 | 0.5 | 1.0 | 0.0 | 1.5 | 33.7 | 66.3 | 0.0 |
| 2.05 | 1.2 | 1.3 | 2.7 | 3.5 | 0.8 | 2.8 | 0.3 | 1.0 | 1.4 | 2.7 | 10.6 | 36.3 | 53.1 |
| 2.07 | 4.7 | 5.1 | 2.5 | 3.2 | 0.2 | 0.7 | 1.1 | 0.9 | 0.4 | 2.3 | 46.9 | 38.1 | 15.0 |
| 2.09 | 0.0 | | 2.7 | 3.5 | 0.1 | 0.3 | 0.0 | 1.0 | 0.2 | 1.1 | 0.0 | 84.6 | 15.4 |
| 2.11 | 0.0 | | 1.0 | 1.3 | 0.2 | 0.7 | 0.0 | 0.4 | 0.4 | 0.7 | 0.0 | 50.3 | 49.7 |
| 2.13 | 0.0 | | 1.8 | 2.3 | 0.5 | 1.7 | 0.0 | 0.6 | 0.9 | 1.5 | 0.0 | 42.2 | 57.8 |
| 2.15 | 0.0 | | 6.9 | 8.9 | 1.7 | 5.9 | 0.0 | 2.5 | 3.0 | 5.5 | 0.0 | 45.1 | 54.9 |
| 2.17 | 0.0 | | 32.6 | 42.3 | 16.0 | 55.4 | 0.0 | 11.7 | 28.2 | 39.9 | 0.0 | 29.2 | 70.8 |
| 2.20 | 0.0 | | 4.8 | 6.2 | 3.2 | 11.1 | 0.0 | 1.7 | 5.6 | 7.4 | 0.0 | 23.3 | 76.7 |
| -2.20 | 0.0 | | 5.3 | 6.9 | 6.2 | 21.5 | 0.0 | 1.9 | 10.9 | 12.8 | 0.0 | 14.8 | 85.2 |
| | 91.6 | 100.0 | 77.1 | 100.0 | 28.9 | 100.0 | | | | | | | |

TEST #36 PIT

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 28.5 |
| S2 | 51.4 |
| S1 | 20.1 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 291.7 | 74.1 | 75.1 | 15.2 | 0.0 | 0.0 | 21.1 | 7.8 | 0.0 | 29.0 | 72.9 | 27.1 | 0.0 |
| 2.01 | 66.9 | 17.0 | 24.1 | 4.9 | 0.0 | 0.0 | 4.8 | 2.5 | 0.0 | 7.4 | 65.8 | 34.2 | 0.0 |
| 2.03 | 14.1 | 3.6 | 15.2 | 3.1 | 0.0 | 0.0 | 1.0 | 1.6 | 0.0 | 2.6 | 39.1 | 60.9 | 0.0 |
| 2.05 | 5.0 | 1.3 | 13.5 | 2.7 | 0.0 | 0.0 | 0.4 | 1.4 | 0.0 | 1.8 | 20.4 | 79.6 | 0.0 |
| 2.07 | 15.7 | 4.0 | 15.7 | 3.2 | 0.0 | 0.0 | 1.1 | 1.6 | 0.0 | 2.8 | 41.0 | 59.0 | 0.0 |
| 2.09 | | | 13.4 | 2.7 | 0.0 | 0.0 | 0.0 | 1.4 | 0.0 | 1.4 | 0.0 | 100.0 | 0.0 |
| 2.11 | | | 16.2 | 3.3 | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 | 1.7 | 0.0 | 100.0 | 0.0 |
| 2.13 | | | 21.5 | 4.4 | 12.1 | 2.3 | 0.0 | 2.2 | 0.5 | 2.7 | 0.0 | 82.7 | 17.3 |
| 2.15 | | | 41.7 | 8.5 | 23.0 | 4.5 | 0.0 | 4.4 | 0.9 | 5.2 | 0.0 | 83.0 | 17.0 |
| 2.17 | | | 211.7 | 43.0 | 370.6 | 71.7 | 0.0 | 22.1 | 14.4 | 36.5 | 0.0 | 60.5 | 39.5 |
| 2.20 | | | 38.9 | 7.9 | 59.1 | 11.4 | 0.0 | 4.1 | 2.3 | 6.4 | 0.0 | 63.9 | 36.1 |
| -2.20 | | | 5.8 | 1.2 | 51.9 | 10.0 | 0.0 | 0.6 | 2.0 | 2.6 | 0.0 | 23.1 | 76.9 |
| | 393.4 | 100.0 | 492.8 | 100.0 | 516.7 | 100.0 | | | | | | | |

PIT

TEST 036 +6 MESH FRACTION

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 28.5 |
| S2 | 51.4 |
| S1 | 20.1 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 15.8 | 65.3 | 5.8 | 12.2 | 0.0 | 0.0 | 18.6 | 6.3 | 0.0 | 24.9 | 74.7 | 25.3 | 0.0 |
| 2.01 | 5.8 | 24.0 | 2.0 | 4.2 | 0.0 | 0.0 | 6.8 | 2.2 | 0.0 | 9.0 | 75.9 | 24.1 | 0.0 |
| 2.03 | 1.7 | 7.0 | 3.4 | 7.2 | 0.0 | 0.0 | 2.0 | 3.7 | 0.0 | 5.7 | 35.2 | 64.8 | 0.0 |
| 2.05 | 0.2 | 0.8 | 1.5 | 3.2 | 0.0 | 0.0 | 0.2 | 1.6 | 0.0 | 1.9 | 12.6 | 87.4 | 0.0 |
| 2.07 | 0.7 | 2.9 | 1.9 | 4.0 | 0.0 | 0.0 | 0.8 | 2.1 | 0.0 | 2.9 | 28.5 | 71.5 | 0.0 |
| 2.09 | 0.0 | | 2.0 | 4.2 | 0.0 | 0.0 | 0.0 | 2.2 | 0.0 | 2.2 | 0.0 | 100.0 | 0.0 |
| 2.11 | | | 3.0 | 6.3 | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 3.3 | 0.0 | 100.0 | 0.0 |
| 2.13 | | | 3.2 | 6.8 | 1.9 | 2.3 | 0.0 | 3.5 | 0.5 | 3.9 | 0.0 | 88.4 | 11.6 |
| 2.15 | | | 7.9 | 16.7 | 6.3 | 7.5 | 0.0 | 8.6 | 1.5 | 10.1 | 0.0 | 85.0 | 15.0 |
| 2.17 | | | 14.4 | 30.4 | 59.8 | 71.5 | 0.0 | 15.6 | 14.4 | 30.0 | 0.0 | 52.1 | 47.9 |
| 2.20 | | | 1.9 | 4.0 | 10.4 | 12.4 | 0.0 | 2.1 | 2.5 | 4.6 | 0.0 | 45.2 | 54.8 |
| -2.20 | | | 0.4 | 0.8 | 5.2 | 6.2 | 0.0 | 0.4 | 1.2 | 1.7 | 0.0 | 25.8 | 74.2 |
| | 24.2 | 100.0 | 47.4 | 100.0 | 83.6 | 100.0 | | | | | | | |

PIT

TEST 036 -6 +10 MESH FRACTION

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 28.5 |
| S2 | 51.4 |
| S1 | 20.1 |

| SG | FLOAT | | S2 | | S1 | | DISTRIBUTION | | | | RECOVERY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRACTION | SAMPLE WT (gm) | SAMPLE WT % | SAMPLE WT (gm) | SAMPLE WT % | SAMPLE WT (gm) | SAMPLE WT % | FLOAT | S2 | S1 | TOTAL | FLOAT | S2 | S1 |
| 1.99 | 160.4 | 74.4 | 45.7 | 16.2 | 0.0 | 0.0 | 21.2 | 8.3 | 0.0 | 29.5 | 71.8 | 28.2 | 0.0 |
| 2.01 | 37.7 | 17.5 | 14.4 | 5.1 | 0.0 | 0.0 | 5.0 | 2.6 | 0.0 | 7.6 | 65.5 | 34.5 | 0.0 |
| 2.03 | 8.5 | 3.9 | 9.1 | 3.2 | 0.0 | 0.0 | 1.1 | 1.7 | 0.0 | 2.8 | 40.3 | 59.7 | 0.0 |
| 2.05 | 3.0 | 1.4 | 9.8 | 3.5 | 0.0 | 0.0 | 0.4 | 1.8 | 0.0 | 2.2 | 18.1 | 81.9 | 0.0 |
| 2.07 | 5.9 | 2.7 | 10.4 | 3.7 | 0.0 | 0.0 | 0.8 | 1.9 | 0.0 | 2.7 | 29.1 | 70.9 | 0.0 |
| 2.09 | 0.0 | | 8.9 | 3.2 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 1.6 | 0.0 | 100.0 | 0.0 |
| 2.11 | 0.0 | | 10.6 | 3.8 | 0.0 | 0.0 | 0.0 | 1.9 | 0.0 | 1.9 | 0.0 | 100.0 | 0.0 |
| 2.13 | 0.0 | | 15.4 | 5.5 | 8.1 | 2.5 | 0.0 | 2.8 | 0.5 | 3.3 | 0.0 | 85.0 | 15.0 |
| 2.15 | 0.0 | | 23.7 | 8.4 | 14.7 | 4.5 | 0.0 | 4.3 | 0.9 | 5.2 | 0.0 | 82.8 | 17.2 |
| 2.17 | 0.0 | | 111.2 | 39.5 | 229.9 | 70.1 | 0.0 | 20.3 | 14.1 | 34.4 | 0.0 | 59.0 | 41.0 |
| 2.20 | | | 20.3 | 7.2 | 40.0 | 12.2 | 0.0 | 3.7 | 2.5 | 6.2 | 0.0 | 60.2 | 39.8 |
| -2.20 | | | 2.2 | 0.8 | 35.1 | 10.7 | 0.0 | 0.4 | 2.2 | 2.6 | 0.0 | 15.7 | 84.3 |
| | 215.5 | 100.0 | 281.7 | 100.0 | 327.8 | 100.0 | | | | | | | |

PIT

TEST 036 -10 MESH FRACTION

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 28.5 |
| S2 | 51.4 |
| S1 | 20.1 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 115.0 | 75.3 | 23.3 | 14.6 | 0.0 | 0.0 | 21.4 | 7.5 | 0.0 | 29.0 | 74.0 | 26.0 | 0.0 |
| 2.01 | 23.4 | 15.3 | 7.6 | 4.8 | 0.0 | 0.0 | 4.4 | 2.5 | 0.0 | 6.8 | 64.0 | 36.0 | 0.0 |
| 2.03 | 3.9 | 2.6 | 2.6 | 1.6 | 0.0 | 0.0 | 0.7 | 0.8 | 0.0 | 1.6 | 46.4 | 53.6 | 0.0 |
| 2.05 | 1.6 | 1.0 | 2.0 | 1.3 | 0.0 | 0.0 | 0.3 | 0.6 | 0.0 | 0.9 | 31.6 | 68.4 | 0.0 |
| 2.07 | 8.8 | 5.8 | 3.2 | 2.0 | 0.0 | 0.0 | 1.6 | 1.0 | 0.0 | 2.7 | 61.4 | 38.6 | 0.0 |
| 2.09 | 0.0 | | 2.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.6 | 0.0 | 100.0 | 0.0 |
| 2.11 | 0.0 | | 2.6 | 1.6 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.8 | 0.0 | 100.0 | 0.0 |
| 2.13 | 0.0 | | 3.0 | 1.9 | 2.2 | 2.1 | 0.0 | 1.0 | 0.4 | 1.4 | 0.0 | 69.9 | 30.1 |
| 2.15 | 0.0 | | 9.9 | 6.2 | 1.9 | 1.8 | 0.0 | 3.2 | 0.4 | 3.6 | 0.0 | 89.9 | 10.1 |
| 2.17 | 0.0 | | 82.8 | 52.0 | 80.8 | 76.4 | 0.0 | 26.7 | 15.3 | 42.1 | 0.0 | 63.5 | 36.5 |
| 2.20 | | | 16.8 | 10.5 | 8.9 | 8.4 | 0.0 | 5.4 | 1.7 | 7.1 | 0.0 | 76.2 | 23.8 |
| -2.20 | | | 3.5 | 2.2 | 12.0 | 11.3 | 0.0 | 1.1 | 2.3 | 3.4 | 0.0 | 33.2 | 66.8 |
| | 152.7 | 100.0 | 159.3 | 100.0 | 105.8 | 100.0 | | | | | | | |

PIF

TEST 9 72

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 27.4 |
| S2 | 22.2 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 313.7 | 69.2 | 77.2 | 15.8 | 0.0 | 0.0 | 18.9 | 3.5 | 0.0 | 22.4 | 84.4 | 15.6 | 0.0 |
| 2.01 | 90.4 | 19.9 | 23.2 | 4.7 | 0.0 | 0.0 | 5.5 | 1.0 | 0.0 | 6.5 | 83.9 | 16.1 | 0.0 |
| 2.03 | 22.5 | 5.0 | 22.2 | 4.5 | 0.0 | 0.0 | 1.4 | 1.0 | 0.0 | 2.4 | 57.5 | 42.5 | 0.0 |
| 2.05 | 8.5 | 1.9 | 18.5 | 3.8 | 0.0 | 0.0 | 0.5 | 0.8 | 0.0 | 1.3 | 38.0 | 62.0 | 0.0 |
| 2.07 | 18.4 | 4.1 | 18.2 | 3.7 | 30.7 | 5.7 | 1.1 | 0.8 | 2.9 | 4.8 | 23.0 | 17.0 | 60.0 |
| 2.09 | | | 20.1 | 4.1 | 8.6 | 1.6 | 0.0 | 0.9 | 0.8 | 1.7 | 0.0 | 52.8 | 47.2 |
| 2.11 | | | 18.6 | 3.8 | 13.4 | 2.5 | 0.0 | 0.8 | 1.3 | 2.1 | 0.0 | 39.9 | 60.1 |
| 2.13 | | | 17.5 | 3.6 | 22.7 | 4.2 | 0.0 | 0.8 | 2.1 | 2.9 | 0.0 | 27.0 | 73.0 |
| 2.15 | | | 19.4 | 4.0 | 32.2 | 6.0 | 0.0 | 0.9 | 3.0 | 3.9 | 0.0 | 22.4 | 77.6 |
| 2.17 | | | 199.6 | 40.7 | 310.9 | 58.1 | 0.0 | 9.0 | 29.3 | 38.4 | 0.0 | 23.5 | 76.5 |
| 2.20 | | | 37.1 | 7.6 | 65.4 | 12.2 | 0.0 | 1.7 | 6.2 | 7.8 | 0.0 | 21.4 | 78.6 |
| -2.20 | | | 18.5 | 3.8 | 51.0 | 9.5 | 0.0 | 0.8 | 4.8 | 5.7 | 0.0 | 14.8 | 85.2 |
| | 453.5 | 100.0 | 490.1 | 100.0 | 534.9 | 100.0 | | | | | | | |

PIF

TEST 0 72 +6 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 27.4 |
| S2 | 22.2 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | RECOVERY TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 41.7 | 70.8 | 6.0 | 10.2 | 0.0 | 0.0 | 19.4 | 2.3 | 0.0 | 21.6 | 89.6 | 10.4 | 0.0 |
| 2.01 | 12.5 | 21.2 | 5.0 | 5.8 | 0.0 | 0.0 | 5.8 | 1.3 | 0.0 | 7.1 | 81.9 | 18.1 | 0.0 |
| 2.03 | 2.7 | 4.6 | 6.9 | 8.0 | 0.0 | 0.0 | 1.3 | 1.8 | 0.0 | 3.0 | 41.5 | 58.5 | 0.0 |
| 2.05 | 1.3 | 2.2 | 5.2 | 6.0 | 0.0 | 0.0 | 0.6 | 1.3 | 0.0 | 1.9 | 31.2 | 68.8 | 0.0 |
| 2.07 | 0.7 | 1.2 | 5.0 | 5.8 | 9.3 | 6.8 | 0.3 | 1.3 | 3.4 | 5.1 | 6.4 | 25.4 | 68.2 |
| 2.09 | | | 5.2 | 6.0 | 2.4 | 1.8 | 0.0 | 1.3 | 0.9 | 2.2 | 0.0 | 60.0 | 40.0 |
| 2.11 | | | 5.4 | 6.3 | 5.2 | 3.8 | 0.0 | 1.4 | 1.9 | 3.3 | 0.0 | 41.8 | 58.2 |
| 2.13 | | | 4.5 | 5.2 | 7.9 | 5.8 | 0.0 | 1.2 | 2.9 | 4.1 | 0.0 | 28.3 | 71.7 |
| 2.15 | | | 4.2 | 4.9 | 11.2 | 8.2 | 0.0 | 1.1 | 4.1 | 5.2 | 0.0 | 20.6 | 79.4 |
| 2.17 | | | 29.9 | 34.6 | 72.0 | 52.8 | 0.0 | 7.7 | 26.7 | 34.3 | 0.0 | 22.3 | 77.7 |
| 2.20 | | | 3.9 | 4.5 | 16.3 | 12.0 | 0.0 | 1.0 | 6.0 | 7.0 | 0.0 | 14.2 | 85.8 |
| -2.20 | | | 2.3 | 2.7 | 12.0 | 8.8 | 0.0 | 0.6 | 4.4 | 5.0 | 0.0 | 11.7 | 88.3 |
| | 58.9 | 100.0 | 86.3 | 100.0 | 136.3 | 100.0 | | | | | | | |

PIF

TEST 8 72 -6 +10 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 27.4 |
| S2 | 22.2 |
| S1 | 50.5 |

| S6 FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | DISTRIBUTION TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 191.8 | 73.1 | 47.7 | 17.0 | 0.0 | 0.0 | 20.0 | 3.8 | 0.0 | 23.8 | 84.2 | 15.8 | 0.0 |
| 2.01 | 45.4 | 17.3 | 12.8 | 4.5 | 0.0 | 0.0 | 4.7 | 1.0 | 0.0 | 5.7 | 82.5 | 17.5 | 0.0 |
| 2.03 | 14.2 | 5.4 | 13.1 | 4.7 | 0.0 | 0.0 | 1.5 | 1.0 | 0.0 | 2.5 | 58.9 | 41.1 | 0.0 |
| 2.05 | 5.3 | 2.0 | 11.5 | 4.1 | 0.0 | 0.0 | 0.6 | 0.9 | 0.0 | 1.5 | 37.9 | 62.1 | 0.0 |
| 2.07 | 5.8 | 2.2 | 11.2 | 4.0 | 18.3 | 5.5 | 0.6 | 0.9 | 2.8 | 4.3 | 14.2 | 20.7 | 65.1 |
| 2.09 | | | 13.1 | 4.7 | 5.4 | 1.6 | 0.0 | 1.0 | 0.8 | 1.8 | 0.0 | 55.8 | 44.2 |
| 2.11 | | | 10.6 | 3.8 | 7.3 | 2.2 | 0.0 | 0.8 | 1.1 | 1.9 | 0.0 | 43.0 | 57.0 |
| 2.13 | | | 11.1 | 3.9 | 13.8 | 4.1 | 0.0 | 0.9 | 2.1 | 3.0 | 0.0 | 29.5 | 70.5 |
| 2.15 | | | 11.5 | 4.1 | 19.0 | 5.7 | 0.0 | 0.9 | 2.9 | 3.8 | 0.0 | 23.9 | 76.1 |
| 2.17 | | | 107.1 | 38.1 | 195.1 | 58.5 | 0.0 | 8.4 | 29.5 | 38.0 | 0.0 | 22.2 | 77.8 |
| 2.20 | | | 21.3 | 7.6 | 42.7 | 12.8 | 0.0 | 1.7 | 6.5 | 8.1 | 0.0 | 20.6 | 79.4 |
| -2.20 | | | 10.4 | 3.7 | 31.9 | 9.6 | 0.0 | 0.8 | 4.8 | 5.6 | 0.0 | 14.5 | 85.5 |
| | 262.5 | 100.0 | 281.4 | 100.0 | 333.5 | 100.0 | | | | | | | |

PIF

TEST 8 72 -10 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 27.4 |
| S2 | 22.2 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 79.8 | 60.8 | 20.5 | 16.9 | 0.0 | 0.0 | 16.6 | 3.7 | 0.0 | 20.4 | 81.7 | 18.3 | 0.0 |
| 2.01 | 32.3 | 24.6 | 5.5 | 4.5 | 0.0 | 0.0 | 6.7 | 1.0 | 0.0 | 7.7 | 87.0 | 13.0 | 0.0 |
| 2.03 | 5.7 | 4.3 | 2.3 | 1.9 | 0.0 | 0.0 | 1.2 | 0.4 | 0.0 | 1.6 | 73.9 | 26.1 | 0.0 |
| 2.05 | 1.7 | 1.3 | 1.6 | 1.3 | 0.0 | 0.0 | 0.4 | 0.3 | 0.0 | 0.6 | 54.9 | 45.1 | 0.0 |
| 2.07 | 11.8 | 9.0 | 1.9 | 1.6 | 3.0 | 4.7 | 2.5 | 0.3 | 2.4 | 5.2 | 47.6 | 6.7 | 45.7 |
| 2.09 | | | 1.7 | 1.4 | 0.4 | 0.6 | 0.0 | 0.3 | 0.3 | 0.6 | 0.0 | 49.6 | 50.4 |
| 2.11 | | | 2.5 | 2.1 | 0.8 | 1.2 | 0.0 | 0.5 | 0.6 | 1.1 | 0.0 | 42.0 | 58.0 |
| 2.13 | | | 1.9 | 1.6 | 0.9 | 1.4 | 0.0 | 0.3 | 0.7 | 1.1 | 0.0 | 32.8 | 67.2 |
| 2.15 | | | 3.8 | 3.1 | 1.9 | 3.0 | 0.0 | 0.7 | 1.5 | 2.2 | 0.0 | 31.6 | 68.4 |
| 2.17 | | | 62.4 | 51.4 | 43.4 | 67.7 | 0.0 | 11.4 | 34.2 | 45.6 | 0.0 | 25.0 | 75.0 |
| 2.20 | | | 11.7 | 9.6 | 6.4 | 10.0 | 0.0 | 2.1 | 5.0 | 7.2 | 0.0 | 29.7 | 70.3 |
| -2.20 | | | 5.7 | 4.7 | 7.3 | 11.4 | 0.0 | 1.0 | 5.8 | 6.8 | 0.0 | 15.3 | 84.7 |
| | 131.3 | 100.0 | 121.5 | 100.0 | 64.1 | 100.0 | | | | | | | |

SIT

TEST # 123

PRODUCT WEIGHT FRACTIONS

| PRODUCT | WEIGHT FRACTIONS |
|---|---|
| FLOAT | 24.7 |
| S2 | 24.9 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 317.9 | 67.2 | 88.1 | 16.4 | 0.0 | 0.0 | 16.6 | 4.1 | 0.0 | 20.7 | 80.2 | 19.8 | 0.0 |
| 2.01 | 107.1 | 22.6 | 32.1 | 6.0 | 0.0 | 0.0 | 5.6 | 1.5 | 0.0 | 7.1 | 79.0 | 21.0 | 0.0 |
| 2.03 | 24.1 | 5.1 | 25.6 | 4.8 | 0.0 | 0.0 | 1.3 | 1.2 | 0.0 | 2.4 | 51.4 | 48.6 | 0.0 |
| 2.05 | 9.0 | 1.9 | 23.5 | 4.4 | 18.4 | 3.0 | 0.5 | 1.1 | 1.5 | 3.1 | 15.2 | 35.2 | 49.6 |
| 2.07 | 14.8 | 3.1 | 18.2 | 3.4 | 6.6 | 1.1 | 0.8 | 0.8 | 0.5 | 2.2 | 35.7 | 39.0 | 25.4 |
| 2.09 | | | 22.6 | 4.2 | 11.6 | 1.9 | 0.0 | 1.0 | 1.0 | 2.0 | 0.0 | 52.0 | 48.0 |
| 2.11 | | | 16.5 | 3.1 | 19.8 | 3.3 | 0.0 | 0.8 | 1.6 | 2.4 | 0.0 | 31.7 | 68.3 |
| 2.13 | | | 20.1 | 3.7 | 25.2 | 4.2 | 0.0 | 0.9 | 2.1 | 3.0 | 0.0 | 30.8 | 69.2 |
| 2.15 | | | 51.8 | 9.6 | 69.5 | 11.5 | 0.0 | 2.4 | 5.8 | 8.2 | 0.0 | 29.3 | 70.7 |
| 2.17 | | | 199.2 | 37.1 | 356.0 | 58.7 | 0.0 | 9.2 | 29.6 | 38.8 | 0.0 | 23.8 | 76.2 |
| 2.20 | | | 25.7 | 4.8 | 61.5 | 10.1 | 0.0 | 1.2 | 5.1 | 6.3 | 0.0 | 18.9 | 81.1 |
| -2.20 | | | 13.5 | 2.5 | 38.2 | 6.3 | 0.0 | 0.6 | 3.2 | 3.8 | 0.0 | 16.4 | 83.6 |
| | 472.9 | 100.0 | 536.9 | 100.0 | 606.8 | 100.0 | | | | | | | |

SIT

TEST 0 123 +6 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 24.7 |
| S2 | 24.9 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | DISTRIBUTION TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 36.5 | 60.6 | 7.6 | 10.7 | 0.0 | 0.0 | 14.9 | 2.7 | 0.0 | 17.6 | 84.8 | 15.2 | 0.0 |
| 2.01 | 17.0 | 28.2 | 6.3 | 8.9 | 0.0 | 0.0 | 7.0 | 2.2 | 0.0 | 9.2 | 75.9 | 24.1 | 0.0 |
| 2.03 | 4.3 | 7.1 | 6.0 | 8.5 | 0.0 | 0.0 | 1.8 | 2.1 | 0.0 | 3.9 | 45.5 | 54.5 | 0.0 |
| 2.05 | 1.4 | 2.3 | 5.0 | 7.1 | 2.8 | 2.2 | 0.6 | 1.8 | 1.1 | 3.4 | 16.7 | 51.2 | 32.1 |
| 2.07 | 1.0 | 1.7 | 5.4 | 7.6 | 1.8 | 1.4 | 0.4 | 1.9 | 0.7 | 3.0 | 13.6 | 62.9 | 23.5 |
| 2.09 | | | 5.3 | 7.5 | 4.3 | 3.4 | 0.0 | 1.9 | 1.7 | 3.6 | 0.0 | 52.4 | 47.6 |
| 2.11 | | | 3.7 | 5.2 | 7.0 | 5.5 | 0.0 | 1.3 | 2.8 | 4.1 | 0.0 | 32.0 | 68.0 |
| 2.13 | | | 4.3 | 6.1 | 7.7 | 6.0 | 0.0 | 1.5 | 3.0 | 4.5 | 0.0 | 33.2 | 66.8 |
| 2.15 | | | 6.9 | 9.7 | 22.8 | 17.8 | 0.0 | 2.4 | 9.0 | 11.4 | 0.0 | 21.2 | 78.8 |
| 2.17 | | | 15.5 | 21.9 | 57.2 | 44.7 | 0.0 | 5.4 | 22.5 | 28.0 | 0.0 | 19.5 | 80.5 |
| 2.20 | | | 3.6 | 5.1 | 15.2 | 11.9 | 0.0 | 1.3 | 6.0 | 7.3 | 0.0 | 17.4 | 82.6 |
| -2.20 | | | 1.2 | 1.7 | 9.3 | 7.3 | 0.0 | 0.4 | 3.7 | 4.1 | 0.0 | 10.3 | 89.7 |
| | 60.2 | 100.0 | 70.8 | 100.0 | 128.1 | 100.0 | | | | | | | |

SIT

TEST 0 123 -6 +10 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 24.7 |
| S2 | 24.9 |
| S1 | 50.5 |

| S6 FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 182.0 | 66.3 | 55.6 | 17.8 | 0.0 | 0.0 | 16.3 | 4.4 | 0.0 | 20.8 | 78.6 | 21.4 | 0.0 |
| 2.01 | 66.8 | 24.3 | 18.9 | 6.1 | 0.0 | 0.0 | 6.0 | 1.5 | 0.0 | 7.5 | 79.9 | 20.1 | 0.0 |
| 2.03 | 15.5 | 5.6 | 16.5 | 5.3 | 0.0 | 0.0 | 1.4 | 1.3 | 0.0 | 2.7 | 51.4 | 48.6 | 0.0 |
| 2.05 | 5.6 | 2.0 | 16.1 | 5.2 | 12.6 | 3.1 | 0.5 | 1.3 | 1.6 | 3.4 | 15.0 | 38.3 | 46.7 |
| 2.07 | 4.6 | 1.7 | 10.9 | 3.5 | 4.3 | 1.1 | 0.4 | 0.9 | 0.5 | 1.8 | 22.7 | 47.8 | 29.4 |
| 2.09 | | | 14.8 | 4.7 | 6.7 | 1.7 | 0.0 | 1.2 | 0.8 | 2.0 | 0.0 | 58.6 | 41.4 |
| 2.11 | | | 10.6 | 3.4 | 11.7 | 2.9 | 0.0 | 0.8 | 1.5 | 2.3 | 0.0 | 36.7 | 63.3 |
| 2.13 | | | 12.3 | 3.9 | 15.9 | 3.9 | 0.0 | 1.0 | 2.0 | 3.0 | 0.0 | 33.1 | 66.9 |
| 2.15 | | | 27.6 | 8.9 | 43.1 | 10.6 | 0.0 | 2.2 | 5.4 | 7.6 | 0.0 | 29.1 | 70.9 |
| 2.17 | | | 106.6 | 34.2 | 247.4 | 61.0 | 0.0 | 8.5 | 30.8 | 39.3 | 0.0 | 21.6 | 78.4 |
| 2.20 | | | 13.8 | 4.4 | 39.2 | 9.7 | 0.0 | 1.1 | 4.9 | 6.0 | 0.0 | 18.4 | 81.6 |
| -2.20 | | | 7.9 | 2.5 | 24.4 | 6.0 | 0.0 | 0.6 | 3.0 | 3.7 | 0.0 | 17.2 | 82.8 |
| | 274.5 | 100.0 | 311.6 | 100.0 | 405.3 | 100.0 | | | | | | | |

SIT

TEST # 123 -10 MESH

PRODUCT WEIGHT FRACTIONS

| | |
|---|---|
| FLOAT | 24.7 |
| S2 | 24.9 |
| S1 | 50.5 |

| SG FRACTION | FLOAT SAMPLE WT (gm) | FLOAT SAMPLE WT % | S2 SAMPLE WT (gm) | S2 SAMPLE WT % | S1 SAMPLE WT (gm) | S1 SAMPLE WT % | DISTRIBUTION FLOAT | DISTRIBUTION S2 | DISTRIBUTION S1 | RECOVERY TOTAL | RECOVERY FLOAT | RECOVERY S2 | RECOVERY S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.99 | 99.0 | 72.1 | 24.7 | 16.1 | 0.0 | 0.0 | 17.8 | 4.0 | 0.0 | 21.8 | 81.6 | 18.4 | 0.0 |
| 2.01 | 23.3 | 17.0 | 6.9 | 4.5 | 0.0 | 0.0 | 4.2 | 1.1 | 0.0 | 5.3 | 78.9 | 21.1 | 0.0 |
| 2.03 | 4.1 | 3.0 | 2.8 | 1.8 | 0.0 | 0.0 | 0.7 | 0.5 | 0.0 | 1.2 | 61.9 | 38.1 | 0.0 |
| 2.05 | 1.8 | 1.3 | 2.4 | 1.6 | 3.0 | 4.1 | 0.3 | 0.4 | 2.1 | 2.8 | 11.5 | 13.9 | 74.6 |
| 2.07 | 9.1 | 6.6 | 1.8 | 1.2 | 0.4 | 0.6 | 1.6 | 0.3 | 0.3 | 2.2 | 74.1 | 13.2 | 12.6 |
| 2.09 | | | 2.4 | 1.6 | 0.5 | 0.7 | 0.0 | 0.4 | 0.3 | 0.7 | 0.0 | 52.8 | 47.2 |
| 2.11 | | | 2.1 | 1.4 | 1.0 | 1.4 | 0.0 | 0.3 | 0.7 | 1.0 | 0.0 | 32.8 | 67.2 |
| 2.13 | | | 3.4 | 2.2 | 1.5 | 2.1 | 0.0 | 0.6 | 1.0 | 1.6 | 0.0 | 34.5 | 65.5 |
| 2.15 | | | 17.4 | 11.3 | 3.6 | 5.0 | 0.0 | 2.8 | 2.5 | 5.3 | 0.0 | 53.0 | 47.0 |
| 2.17 | | | 77.0 | 50.2 | 51.1 | 70.5 | 0.0 | 12.5 | 35.6 | 48.1 | 0.0 | 26.0 | 74.0 |
| 2.20 | | | 8.2 | 5.3 | 7.0 | 9.7 | 0.0 | 1.3 | 4.9 | 6.2 | 0.0 | 21.4 | 78.6 |
| -2.20 | | | 4.3 | 2.8 | 4.4 | 6.1 | 0.0 | 0.7 | 3.1 | 3.8 | 0.0 | 18.5 | 81.5 |
| | 137.3 | 100.0 | 153.4 | 100.0 | 72.5 | 100.0 | | | | | | | |

# APPENDIX 3

TABLE 2

SIZE FRACTION DISTRIBUTION AMONGST
TRI-FLO PRODUCTS.

1. Test # 36 PIT

| | WT% | % +6 | % -6 +10 | % -10 | UNITS +6 | UNITS -6 +10 | UNITS -10 | DISTRIBUTION +6 | DISTRIBUTION -6 +10 | DISTRIBUTION -10 |
|---|---|---|---|---|---|---|---|---|---|---|
| FLOAT | 28.5 | 6.1 | 54.8 | 38.8 | 1.7 | 15.6 | 11.1 | 17.5 | 27.0 | 34.8 |
| S2 | 51.4 | 9.6 | 57.2 | 32.3 | 4.9 | 29.4 | 16.6 | 49.7 | 50.9 | 52.2 |
| S1 | 20.1 | 16.2 | 63.4 | 20.5 | 3.3 | 12.7 | 4.1 | 32.8 | 22.1 | 13.0 |
| | | | | | 9.9 | 57.8 | 31.8 | 100.0 | 100.0 | 100.0 |

2. Test # 72 PIF

| | WT% | % +6 | % -6 +10 | % -10 | UNITS +6 | UNITS -6 +10 | UNITS -10 | DISTRIBUTION +6 | DISTRIBUTION -6 +10 | DISTRIBUTION -10 |
|---|---|---|---|---|---|---|---|---|---|---|
| FLOAT | 27.4 | 13.0 | 57.9 | 28.9 | 3.6 | 15.9 | 7.9 | 17.5 | 26.4 | 40.6 |
| S2 | 22.2 | 17.6 | 57.4 | 24.8 | 3.9 | 12.7 | 5.5 | 19.2 | 21.2 | 28.3 |
| S1 | 50.5 | 25.5 | 62.3 | 12.0 | 12.9 | 31.5 | 6.1 | 63.3 | 52.4 | 31.1 |
| | | | | | 20.3 | 60.1 | 19.5 | 100.0 | 100.0 | 100.0 |

3. Test # 123 SIT

| | WT% | % +6 | % -6 +10 | % -10 | UNITS +6 | UNITS -6 +10 | UNITS -10 | DISTRIBUTION +6 | DISTRIBUTION -6 +10 | DISTRIBUTION -10 |
|---|---|---|---|---|---|---|---|---|---|---|
| FLOAT | 24.7 | 12.7 | 58.0 | 29.0 | 3.1 | 14.3 | 7.2 | 18.4 | 22.9 | 35.2 |
| S2 | 24.9 | 13.2 | 58.0 | 28.6 | 3.3 | 14.4 | 7.1 | 19.2 | 23.1 | 35.0 |
| S1 | 50.5 | 21.1 | 66.8 | 12.0 | 10.7 | 33.7 | 6.1 | 62.4 | 54.0 | 29.8 |
| | | | | | 17.1 | 62.5 | 20.3 | 100.0 | 100.0 | 100.0 |

4. Test # 135 PIF (COARSE)

| | WT% | % +6 | % -6 +10 | % -10 | UNITS +6 | UNITS -6 +10 | UNITS -10 | DISTRIBUTION +6 | DISTRIBUTION -6 +10 | DISTRIBUTION -10 |
|---|---|---|---|---|---|---|---|---|---|---|
| FLOAT | 21.4 | 26.8 | 59.0 | 14.1 | 5.7 | 12.6 | 3.0 | 14.7 | 24.0 | 36.7 |
| S2 | 27.6 | 34.8 | 53.5 | 11.5 | 9.6 | 14.8 | 3.2 | 26.7 | 28.0 | 38.4 |
| S1 | 51.0 | 46.3 | 49.5 | 4.0 | 23.6 | 25.3 | 2.1 | 60.6 | 48.0 | 24.9 |
| | | | | | 39.0 | 52.6 | 8.2 | 100.0 | 100.0 | 100.0 |

# APPENDIX D

# CONSULTING REPORT FOR ORDER OF MAGNITUDE COSTS

# FOR A FULL SCALE TRI-FLO SEPARATION PLANT

# FOR POTASH ORE

CASCADE
PROJECT MANAGERS

**CASCADE MANAGEMENT INC.**
203 - 2225 Hanselman Ct.
Saskatoon, Sask.
S7L 6A8
Tel. (306) 244-7200

November 2, 1987

Cominco Chemicals & Fertilizers
VANSCOY, Saskatchewan
SOL 3JO

Attn: Mr. D.A. Cormode

RE: Heavy Media Separation Plant
Order of Magnitude Cost Estimate - Building

Dear Sir:

The above order of magnitude cost estimate has been completed and six copies are being forwarded for your record and distribution. We are available, at your convenience, to discuss the assumptions made and the estimated costs presented, should this be required.

If we can be of any further assistance with this project please do not hesitate to contact us.

Yours truly,

John L. Lees
CASCADE MANAGEMENT INC.

JLL/djr
Encl.

CASCADE
PROJECT MANAGERS

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Ct.
Saskatoon, Sask.
S7L 6A8
Tel. (306) 244-7200

# ORDER OF MAGNITUDE COST ESTIMATE - BUILDING

## HEAVY MEDIA SEPARATION

PROJECT MANAGERS

**CASCADE MANAGEMENT INC.**
203 - 2225 Hanselman Ct.
Saskatoon, Sask.
S7L 6A8
Tel. (306) 244-7200

## CONTENTS

SECTION 1 ..... Estimate Report

SECTION 2 ..... Estimate Summary

SECTION 3 ..... Estimate Sheets

SECTION 4 ..... Sketches & Information

PROJECT MANAGERS

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Ct.
Saskatoon, Sask.
S7L 6A8
Tel. (306) 244-7200

# ORDER OF MAGNITUDE COST ESTIMATE - BUILDING
# HEAVY MEDIA SEPARATION

## 1.0 INTRODUCTION

Cascade Management Inc. has been engaged to prepare an order-of-magnitude estimate for a building and support facilities required for a Heavy Media Separation installation at a typical potash mine. The Cominco mine at Vanscoy has been used as the basis for this estimate with assumptions as to site conditions, tie-ins, etc. resulting from known conditions at this location. Quantities and costing information have been derived from recent similar construction at Cominco, particularly the Compaction Plant Expansion completed in 1982 and the Ammonia Storage Facility completed in 1987.

Process costs are not included in this estimate. It includes the building complete with lighting, ventilation, etc. and allowances have been made for magnetite receiving, storage, and handling.

This estimate is presented in 4 sections. The Estimate Report, Section 1, contains a basic cost summary and outlines building guidelines, project scope, estimate background information, and particular exclusions. A more detailed Estimate Summary is included as Section 2 and a set of detailed Estimate Sheets is presented as Section 3. The final section contains sketches and background information.

## 2.0 COST

### 2.1 Cost Summary

The estimated cost for the heavy media separation plant building (excluding process) is as follows:

| | |
|---|---|
| Demolition | $ 30,000 |
| Earthwork | 30,000 |
| Piling | 119,150 |
| Concrete Foundations | 88,350 |
| Concrete Suspended Slab | 50,000 |
| Structural Steel | 1,065,460 |
| Siding, Roofing, Roof Deck | 216,400 |
| Misc. Architectural | 21,400 |
| Magnetite Handling & Storage | 74,350 |
| Mechanical | 292,200 |
| Electrical | 135,800 |
| SUBTOTAL | 2,123,110 |
| Unallocated Contingency (5%) | 106,890 |
| TOTAL DIRECT COSTS | 2,230,000 |
| Design & Construction Indirects Costs (20%) | 446,000 |
| TOTAL | $2,676,000 |

PROJECT MANAGERS

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2.0 **COST** (Cont'd)

2.1 **Cost Summary** (Cont'd)

Note: This estimate is based on a free-standing structure independent of the existing mill but architecturally tied-in along one 90' wall. If the building can be structurally tied-in to the existing mill, thus eliminating 5 columns and foundations, etc., this estimate can be reduced by $101,500 giving a revised total cost of $2,574,500.

2.2 **Accuracy**

The probable accuracy of this estimate is from -20% to +5% based on the assumptions outlined herein.

It should be noted that, for purposes of this estimate, the building has not only been sized to house the required equipment but also, at Cominco's request, to provide sufficient clearance to the first floor to permit operation of a mobile crane inside the building. Specific layout and operating requirements at other locations, if significantly different from those at Cominco, could affect the estimated cost.

3.0 **INFORMATION BASIS**

This order of magnitude estimate is based on the following:

3.1 **Building Guidelines**

3.1.1 Size
- 60' x 90' x 76' high connected to the existing mill along one 90' wall. The 76' height was derived from Outokumpu sketch 6 with the additional provision, as requested by Cominco, that the 1st suspended floor be at elevation 23' to allow for mobile crane access.
- 2½ interior suspended floors as per Outokumpu sketch 6. 1½ floors to be open grating and 1 floor to be reinforced concrete with raised curbs and safety grating platforms and walkways as required.
- in addition to the above, 2 alternate building sizes were considered as noted in item 7.0 below.

3.1.2 Location - expansion to existing mill building (see SK-001)

3.1.3 Structure - conventional construction with pile foundations; concrete pile caps, grade beams and slab on grade; structural steel (epoxy painted); fiberglass exterior siding with vinyl-clad steel liner; built-up roofing; galvanized steel roof deck (painted).

3.0 **INFORMATION BASIS** (Cont'd)

3.2 **Drawings**

Inpromin/Outokumpu sketches 5 and 6
Miscellaneous Sketches (see Section 4)

3.3 **Correspondence**

Minutes of Meeting of February 27/87 (Cominco; Inpromin/Outokumpu)

4.0 **PROJECT SCOPE AND PRICING BASIS**

4.1 Construction Management would be used and the work would be done under the following major contracts:

4.1.1 **Piling**

4.1.2 **Foundations and Concrete**

- would include basic magnetite receiving and storage facilities

4.1.3 **Structural Steel**

4.1.4 **Siding**

4.1.5 **Roofing and Roof Deck**

4.1.6 **Concrete Slab and Misc. Architectural**

4.1.7 **Mechanical**

4.1.8 **Electrical**

4.2 In terms of physical characteristics, the building has been assumed to be very similar to the existing new compaction plant constructed at Cominco in 1982. Structural components were downsized to reflect the reduced building height and assumed lower loads and vibration requirements. Compaction Plant quantities were modified to reflect the reduced building size and were used as a basis for this estimate.

4.3 Prices are based on our historical records and current budget quotations along with cost information from the construction of the ammonia storage facility near Cominco Potash. Escalation has been included to reflect expected prices in 1988. A contingency of 5% is included for unallocated items. An allowance of 20% has been included for design and construction indirects.

5.0 **TAXES AND FREIGHT**

This estimate includes applicable taxes and freight at current rates.

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## 6.0 EXCLUSIONS

All Process Equipment and Installations including piping, electrical, and controls.

Risk Contingency

Owner's administration and management cost

Interest during construction on Owner's funds

Start-up/Commissioning

Permits, Licenses, Insurance (other than required by Contractors)

## 7.0 ALTERNATES

In addition to the 76' high structure upon which this estimate is based, two alternate building sizes were considered as follows;

7.1 Alt. 1 - Structure 93' high to match existing Cominco mill c/w 2½ floors as required for equipment. Additional 17' provision for future expansion.

TOTAL ESTIMATE = $2,980,000

7.2 Alt. 2 - Structure 93' high c/w 5 floors to match existing Cominco mill.

TOTAL ESTIMATE = $3,787,000

Note: The area proposed for the HMS facility was identified, in the original mill plan, as available for flotation expansion. It was confirmed, during discussions with Cominco, that present flotation capacity is adequate and that, since the HMS process would further reduce flotation requirements, future expansion to the east would be extremely unlikely. Therefore, this estimate has been based on HMS facility requirements only with no additional provisions for future expansion.

Prepared by:

J. Whittle
CASCADE MANAGEMENT INC.

JW/djr

PROJECT MANAGERS

CASCADE MANAGEMENT INC.
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# ESTIMATE SUMMARY

## Heavy Media Separation - Building

| | | | |
|---|---|---|---|
| 1.0 | PILING | | |
| | - Pipe Supply | $ 61,600 | |
| | - Concrete Fill | 18,750 | |
| | - Installation | 33,800 | |
| | - Mobilization & Demobilization | 5,000 | |
| | TOTAL PILING | | **$119,150** |
| 2.0 | EARTHWORK & DEMOLITION | | |
| | - Excavation | $ 9,000 | |
| | - Backfill | 6,000 | |
| | - Demolition ... concrete | 4,000 | |
| | ... siding | 26,000 | |
| | - Roads | 11,000 | |
| | - Site Grading | 4,000 | |
| | TOTAL EARTHWORK & DEMOLITION | | **$ 60,000** |
| 3.0 | CONCRETE (BUILDING) | | |
| | - Pile Caps | $ 16,800 | |
| | - Grade Beams | 28,550 | |
| | - Anchor Bolts | 3,000 | |
| | - Sump & Misc. Equipment Foundations | 5,000 | |
| | - Slab on Grade | 35,000 | |
| | - Suspended Slab | 50,000 | |
| | TOTAL CONCRETE | | **$138,350** |
| 4.0 | MAGNETITE RECEIVING & STORAGE | | |
| | - Magnetite Receiving | $ 12,150 | |
| | - Magnetite Storage (Primary) | 52,200 | |
| | - Magnetite Storage (Secondary) | 10,000 | |
| | TOTAL MAGNETITE HANDLING | | **$ 74,350** |
| 5.0 | SIDING & ROOFING | | |
| | - Siding | $147,000 | |
| | - Roof Deck | 27,000 | |
| | - Roofing | 32,400 | |
| | - Tie-in | 10,000 | |
| | TOTAL SIDING & ROOFING | | **$216,400** |

PROJECT MANAGERS

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# ESTIMATE SUMMARY

## Heavy Media Separation - Building

| | | | |
|---|---|---|---|
| 6.0 | STRUCTURAL STEEL | | |
| | - Columns | $125,430 | |
| | - Beams | 593,030 | |
| | - Grating | 300,000 | |
| | - Stairs, kickplate, H/R | 47,000 | |
| | TOTAL STRUCTURAL STEEL | | **$1,065,460** |
| 7.0 | MISC. & ARCHITECTURAL | | |
| | - O/H Door | $ 5,000 | |
| | - Mandoors/Hardware | 1,400 | |
| | - Misc. | 5,000 | |
| | - Final Grading | 10,000 | |
| | TOTAL ARCHITECTURAL | | **$ 21,400** |
| 8.0 | MECHANICAL (Excluding Process) | | |
| | - Fire Protection | $ 5,200 | |
| | - Hoists & Monorails | 50,000 | |
| | - Manlift | 40,000 | |
| | - Fans/Ventilation/Ductwork | 35,000 | |
| | - Heaters | 25,000 | |
| | - Pump | 5,000 | |
| | - Piping | 132,000 | |
| | TOTAL MECHANICAL | | **$ 292,200** |
| 9.0 | ELECTRICAL (Excluding Process) | | |
| | - MCC & Starters | $ 2,000 | |
| | - Controls | 6,000 | |
| | - Power Distribution | 5,000 | |
| | - Lighting | 111,100 | |
| | - Emergency Lighting | 5,200 | |
| | - Grounding | 6,500 | |
| | TOTAL ELECTRICAL | | **$ 135,800** |
| | SUBTOTAL | | **$2,123,110** |

PROJECT MANAGERS

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Ct.
Saskatoon, Sask.
S7L 6A8
Tel. (306) 244-7200

## ESTIMATE SUMMARY

### Heavy Media Separation - Building

| | | |
|---|---|---|
| 10.0 CONTINGENCY | | |
| - For Unallocated Items (5%) | | $ 106,890 |
| | TOTAL DIRECT COSTS | $2,230,000 |
| 11.0 INDIRECT COSTS | | |
| - Design and Construction (20%) | | $ 446,000 |
| | TOTAL ESTIMATE | $2,676,000 |

12.0 REDUCTION FOR STRUCTURAL TIE-IN (Potential)

| | | |
|---|---|---|
| - Structural Steel | $51,800 | |
| - Concrete | 14,700 | |
| - Piling | 35,000 | |
| TOTAL REDUCTION | 101,500 | |
| REVISED ESTIMATE | | $2,574,500 |

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Court
Saskatoon, Sask.
S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD.
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION:
BY DATE EST. NO
SHEET 1 OF 9
CONTR. SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| PILING<br>16" Ø steel pipe<br>concrete filled<br>.312" wall thickness | | | | | | | | | | |
| Pipe Supply<br>52 @ 65' = 3380 LF<br>3380 @ 52.1 #/LF = 88 tons | ton | 88 | | | @ 700 61,600 | | | | | 61,6 |
| Concrete | CM | 125 | | | @ 150 18750 | | | | | 18,7 |
| Pile Driving | LF | 3380 | | | @ 10 33800 | | | | | 33,8 |
| Mob & Demob | LS | 1 | | | 5000 | | | | | 5,0 |
| | | | | | | | | | | 119 |
| | | | | | | | | | | @ 35.25/LF |

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203 - 2225 Hanselman Court
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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD
PROJECT: HMS Expansion
LOCATION: POTASH - Vanscoy
DESCRIPTION:
BY | DATE | EST. NO

SHEET 2 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| EXCAVATION | cy | 920 | @ $10.00/cy | | | | 9200 | | | ≈ 900 |
| BACKFILL (granular) (granular $ from Tingley for BASF area - 4 holes) | cy | 258 | @ $25.00/cy | | | | 6450 | | | ≈ 600 |
| DEMOLITION | | | | | | | | | | |
| concrete grade beams | LS | (2 men for 1 day, 1 day by crane) | | | | | 4000 | | | 400 |
| remove siding (5 men 3 weeks) | | | 600 @ $40.00 | 24000 | | | | | | 2400 |
| - addl for Thuberner gallery (3 men 2 days) | | | 48 @ $40.00 | ≈ 2000 | | | | | | 200 |
| ACCESS ROAD | | | | | | | | | | |
| Gravel | cy | 500 | @ $20.00/cy | | | | 10000 | | | 1000 |
| Culvert | LS | 1 | | | | | 1000 | | | 100 |
| SITE GRADING (laydown - gravel) | cy | 200 | @ $20.00/cy | | | | 4000 | | | 400 |
| | | | | | | | | | ≈ | $6000. |

**CASCADE MANAGEMENT INC.**
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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION:
BY | DATE | EST. NO
SHEET 3 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| CONCRETE | | | | | EPOXY COATED REBAR | | | | | |
| Pile Caps | | | | | | | | | | |
| 15 5'x5'x3' | CY | 42 | @ $350/cy + $50 = $400/cy ($450/cm) | | ($525/cm) | | 16800 | | | 16800 |
| Grade Beams | | | | | | | | | | |
| 5' high 1' thick | CY | 36 | @ $400/cy + $50 = $450/cy ($525/cm) | | ($590/cm) | | 16200 | | | 16200 |
| 20'×5'×1' = 100 } 260<br>20'×4'×2' = 160 | | | | | | | | | | |
| drill & dowel to thicken | CY | 10 | @ $400/cy + $50 = $450/cy | | | | 4500 | | | 4500 |
| 20'×5'×1' = 100 } 260 = 9.6cy<br>20'×4'×2' = 160 | | | | | | | | | | |
| Pilasters | | | | | | | | | | |
| 2'-6×2'-6×5' high | CY | 17.4 | @ $400/cy + $50 = $450/cy ($525/cm) | | ($590/cm) | | 7830 | | | 783 |
| Access Path | EA | 00 | @ $50.00 | | | | 3000 | | | 300 |
| Sump Pit | LS | 1 | | | | | 2500 | | | 250 |
| Misc. Concrete Slab | CY | 5 | @ $500.00 | | | | 2500 | | | 250 |
| Slab on Grade 6" thick | CY | 100 | @ $300.00/cy + $50 = $350/cy ($460/cm) | | | | 35000 | | | 3500 |
| | | | | | | | | | ≈ | $ 00350 |

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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION:
BY | DATE | EST. NO

SHEET 4 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| CONCRETE | | | | | | | | | | |
| Suspended Slab | | | | | | | | | | |
| (1 floor - 8" thick incl curbs, beams, etc.) | | | | | | | | | | |
| 60'x90'x16" | CY | 100 | @ $500.00/CY ($655/CM) | | | | 50,000 | | | 50,000 |
| Magnetite Receiving | | | | | | | | | | |
| 50'x5'x15' high | CY | 230 | @ $25.00/CY | | | | 5750 | | | |
| cribbing 3'x8' 75' long 5' high | FBM | 3200 | @ $500.00/M | | | | 1600 | | | |
| Lab. for cribbing from curb | | | 160 @ $30.00 | $4800 | | | | | | |
| | | | | $800 | | | 7350 | | | 12150 |
| Magnetite Storage (Primary) | | | | | | | | | | |
| 200 T/HR for 10HR = 2000 T | | | | | | | | | | |
| Density 3.0 = 187.2 lb/CF ≈ 800 CY | storage volume | | | | | | | | | |
| say 40' □ x 6' high ret. walls | in 3 walls | | | | | | | | | |
| S.O.G.: 2' drained gravel bed | CY | 150 | @ $25.00 | | | | 3750 | | | |
| excavation | CY | 225 | @ $10.00 | | | | 2250 | | | |
| concrete 1' thick (3 sides) | CY | 60 | @ $350.00/CY ($460/CM) | | | | 21000 | | | |
| ret. walls, 1' thick avg | CY | 36 | @ $450.00/CY ($590/CM) | | | | 16200 | | | |
| spread footings, bulkheads | CY | 20 | @ $450.00/CY | | | | 9000 | | | |
| | | | | | | | 52,200 | | | 52,200 |
| Magnetite Storage (at plant) | | | | | | | | | | |
| Allowance for "hopper" | | | | | | | | | | |
| & slurry agitator/pumps | LS | | | | | | 10,000 | | | 10,000 |
| | | | | | | | | | | 124,350 |

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Court
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(306) 244-7200

CLIENT: COMINCO LTD
PROJECT: HMTS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION:
BY DATE EST. NO

SHEET 5 OF 9
CONTR. SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| SIDING<br>Steel - vinyl clad liner<br>4m integral vap.<br>barrier<br>-- insulation<br>- "Versa-Cor" ext. sht. | SF | 15976 | @ $9.50 = $ | | | | 147,000 | | | 147,000 |
| ROOF DECK<br>std. ... 22 ga, painted inside<br>1 level, 1 area | SF | 5400 | @ $5.00 = $ | | | | 27,000 | | | 27,00 |
| ROOFING | SF | 5400 | @ $6.00 | | | | 32,400 | | | 32,40 |
| Tie-in to exist plant<br>prov. for openings, etc. | LS | 1 | | | | | 10,000 | | | 10,00 |
| | | | | | | | | | | |
| | | | | | | | | | | $219,40 |

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203 - 2225 Hanselman Court
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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD.
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION:
BY | DATE | EST. NO

SHEET 6 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| STRUCTURAL STEEL | | | | | | | | | | |
| Columns 109 #/LF | T | 29.4 | @ | $2200 | | | 64,680 | | | 64,680 |
| Columns 90 #/LF | T | 24.3 | @ | 2500 | | | 60,750 | | | 60,750 |
| Beams, etc. <20 #/LF | T | 40.0 | @ | 3500 | | | 161,000 | | | 161,000 |
| Beams, etc. 20# - 39#/LF | T | 75.0 | @ | 3200 | | | 240,000 | | | 240,000 |
| Beams, etc. 40# - 99#/LF | T | 54.9 | @ | 2500 | | | 137,250 | | | 137,250 |
| Beams, etc > 99#/LF | T | 24.9 | @ | 2200 | | | 54,780 | | | 54,780 |
| Grating @ 10#/SF | SF | 10,000 | @ | $30 | | | 300,000 | | | 300,000 |
| Checkerplate | ⊖ | | | | | | ⊖ | | | ⊖ |
| Kickplate | T | 1.7 | @ | 4000 | | | 6,800 | | | 6,800 |
| Handrail | T | 4.4 | @ | 4000 | | | 17,600 | | | 17,600 |
| Stair Treads | ea. | 156 | @ | 50 | | | 7,800 | | | 7,800 |
| Stair Stringers | T | 3.7 | @ | 4000 | | | 14,800 | | | 14,800 |
| | | | | | | | $1,065,460 | | | $1,065,460 |

CASCADE MANAGEMENT INC.
203 - 2225 Hanselman Court
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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD.
PROJECT: HMS Expansion
LOCATION: Potash - Vanscoy
DESCRIPTION:
BY | DATE | EST. NO

SHEET 7 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| MISC & ARCH. | | | | | | | | | | |
| O/H Door | LS | 1 | | | | | 5000 | | | 500 |
| Mandoors / Hardware | LS | 2 | | @ $700 | | | 1400 | | | 140 |
| Site Grading | LS | 1 | | | | | 10000 | | | 1000 |
| Painting, Caulking, Flashing, etc. | LS | 1 | | | | | 5000 | | | 500 |

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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY
DESCRIPTION
BY DATE EST. NO


CONTR. SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| Building Mechanical | | | | | | | | | | |
| Fire Protection | | | allowance | | | | | | | 5,200 |
| Hoists & Monorails | | | " | | | | | | | 50,000 |
| Man lift | | | " | | | | | | | 40,000 |
| Fans / Ventilation | | | " | | | | | | | 10,000 |
| Ductwork | | | " | | | | | | | 25,000 |
| Heaters | | | " | | | | | | | 25,000 |
| Pump | | | " | | | | | | | 5,000 |
| Piping - Above ground | | | " | | | | | | | 120,000 |
| - 4/6 | | | " | | | | | | | 12,000 |
| | | | | | | | | | | 292,200 |
| Building Electrical | | | | | | | | | | |
| Mcc & Starter | | | " | | | | | | | 2,000 |
| Controls | | | " | | | | | | | 6,000 |
| Cable & Wiring | | | " | | | | | | | 5,000 |
| Lighting Transformer | | | " | | | | | | | 8,000 |
| Lighting Panel | | | " | | | | | | | 3,500 |
| Lighting Fixtures | | | " | | | | | | | 76,600 |
| Lighting Wiring | | | " | | | | | | | 23,000 |
| Grounding | | | " | | | | | | | 6,500 |
| Emergency Lighting | | | " | | | | | | | 5,200 |
| | | | | | | | | | | 135,800 |

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S7L 6A8
(306) 244-7200

CLIENT: COMINCO LTD.
PROJECT: HMS EXPANSION
LOCATION: POTASH - VANSCOY

DESCRIPTION: Reductions to be applied to estimate if structural tie-in to existing mill is possible.

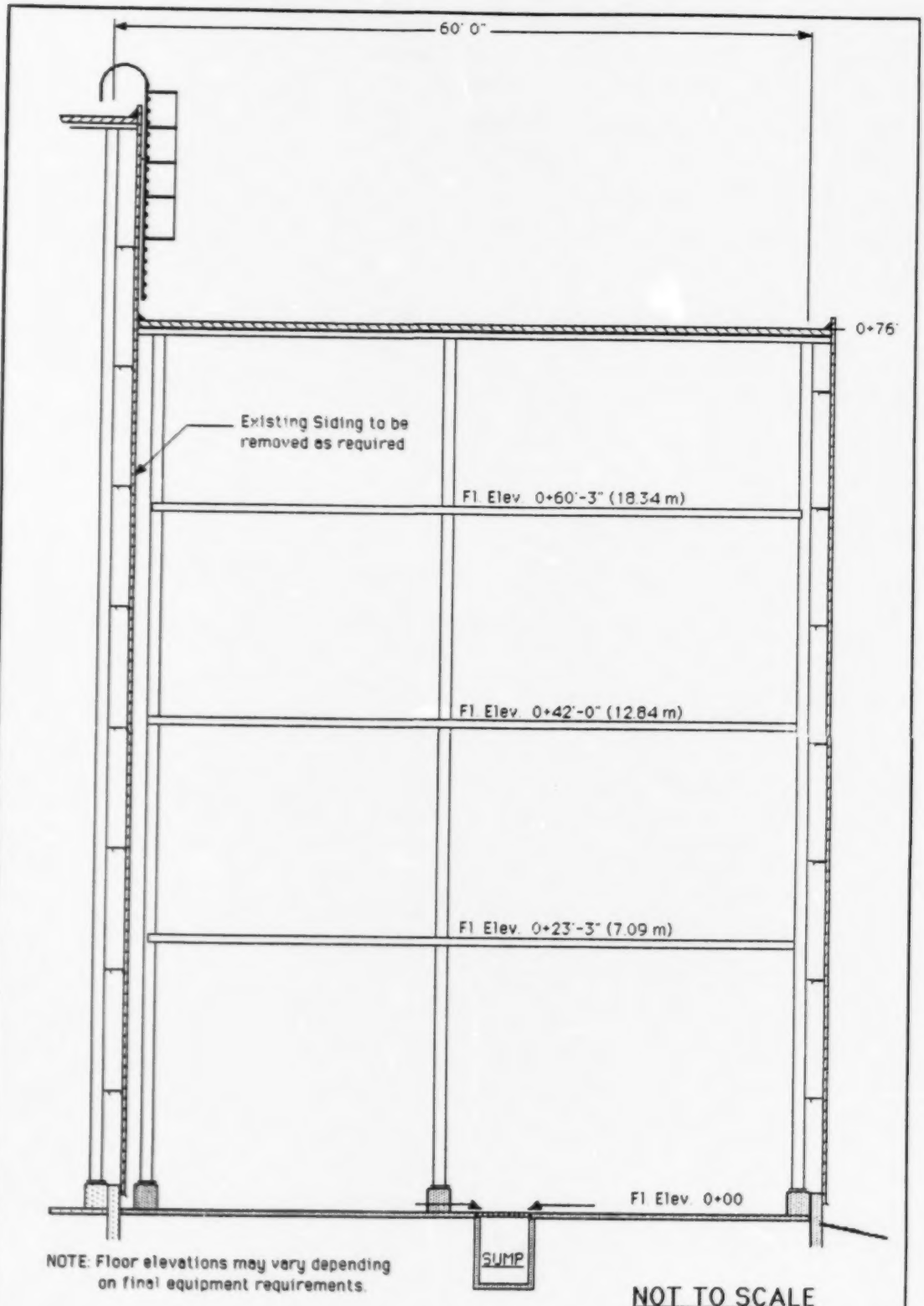
BY | DATE | EST. NO

SHEET 9 OF 9
CONTR. | SUBD.

| ITEM | U | QTY | MANHRS TOTAL | LABOUR COST | MATERIAL COST | PERM. EQUIP. COST | SUB CONTR. COST | CONST. EQUIP. COST | TOTAL U | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|
| Structural Steel | | | | | | | | | | |
| Columns 109 #/LF | T | 9.8 | @ $2200/T | | | | | | | 21,560 |
| Columns 90 #/LF | T | 8.1 | @ $2500/T | | | | | | | 20,250 |
| Beams, misc. | LS | 1 | | | | | | | | 10,000 |
| Piling | LS | | | | | | | | | 35,000 |
| Concrete Fdns. | | | | | | | | | | |
| pile caps. | LS | | | | | | | | | 5600 |
| grade beams & pilasters | LS | | | | | | | | | 8010 |
| anchor bolts. | LS | | | | | | | | | 1000 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | $101,500 |

# HEAVY MEDIA PLANT
## SITE PLAN

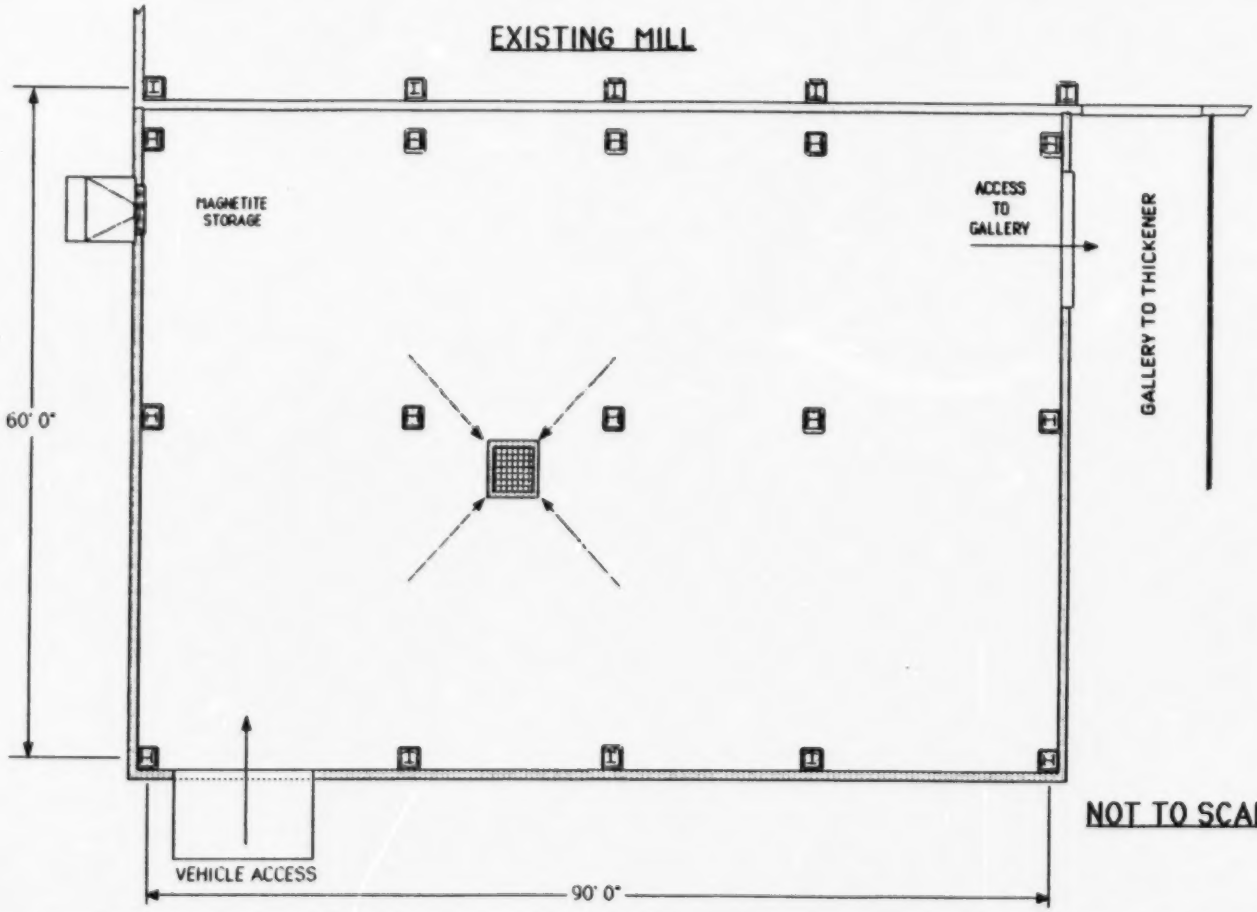
| | | |
|---|---|---|
| Drawing No | SK - 001 | |
| Date | By | Rev. |
| CASCADE MANAGEMENT INC | | PROJECT 2011 |




NOTE: Floor elevations may vary depending on final equipment requirements.

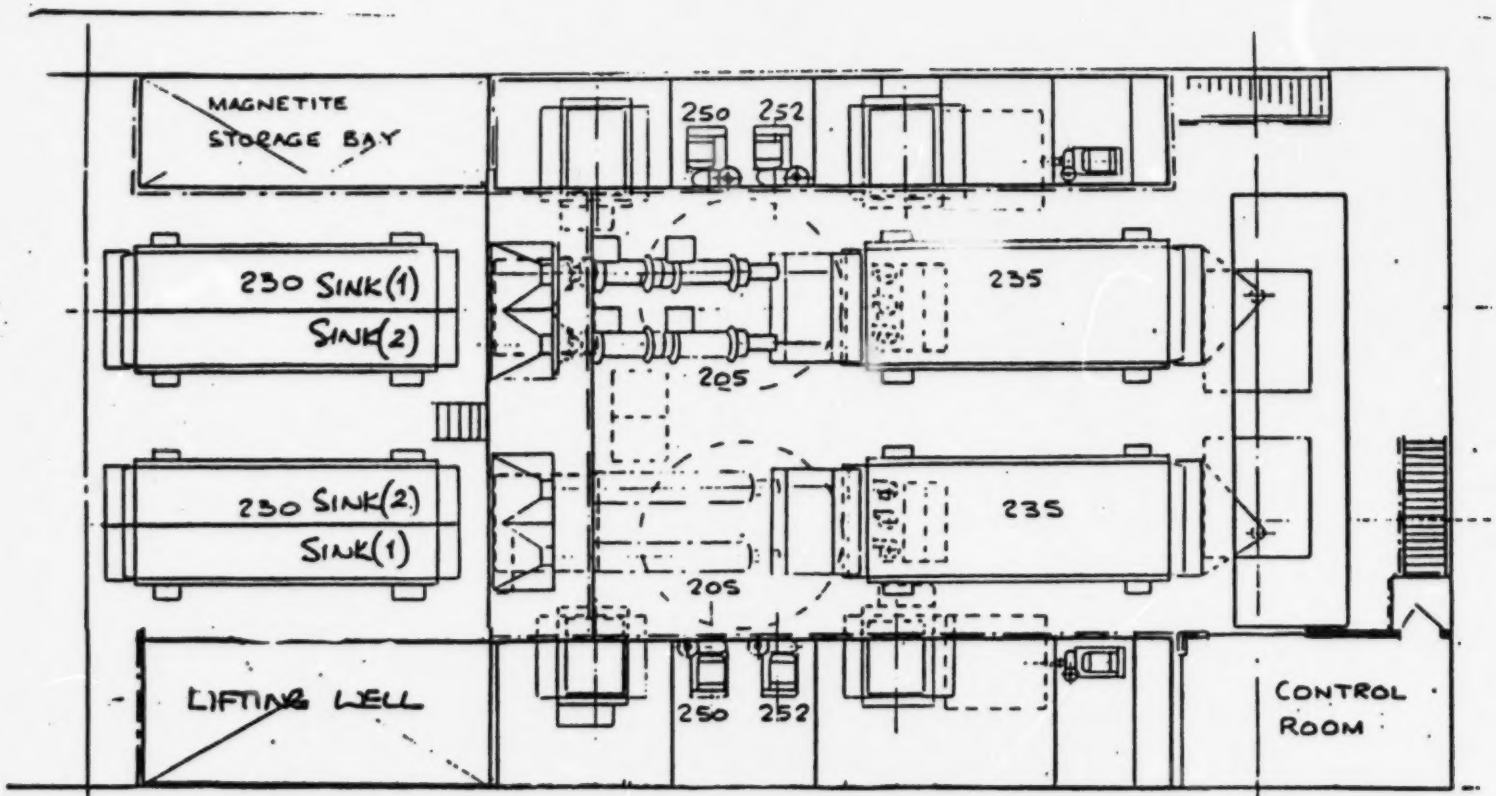
NOT TO SCALE

| | | | |
|---|---|---|---|
| | HEAVY MEDIA PLANT | Drawing No. | SK - 002 |
| | ELEVATION | Date: | By: Rev. |
| | | CASCADE MANAGEMENT INC. | PROJECT 2011 |




# HEAVY MEDIA PLANT
## GROUND FLOOR PLAN

| | | |
|---|---|---|
| Drawing No. SK-003 | | |
| Date | By | Rev. |
| CASCADE MANAGEMENT INC. | | PROJECT 2011 |



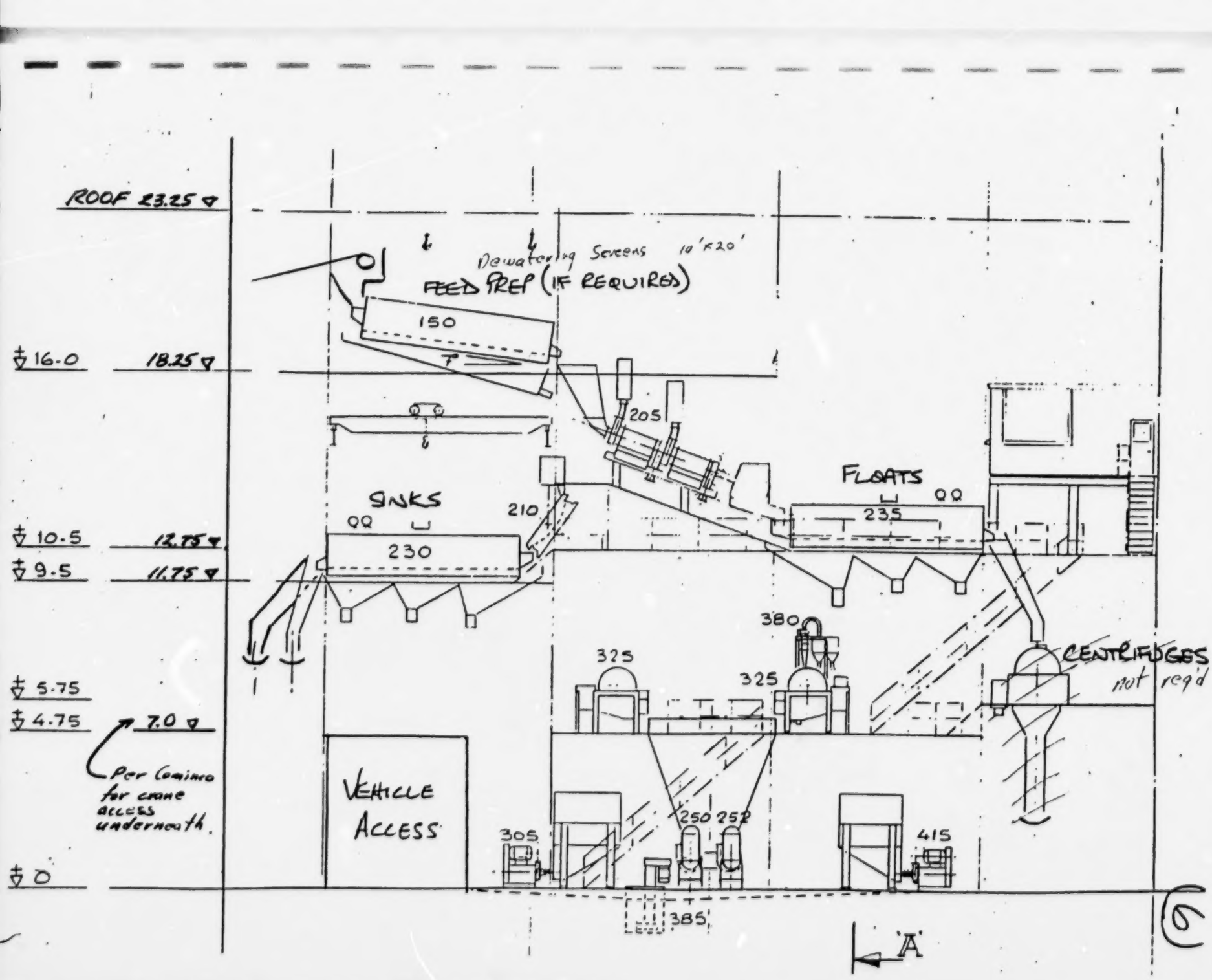

+16·0 LEVEL OMITTED

℄ SINK CONVEYOR(S)

≈ 30·0 × 15·0 metres. AS DRAWN
MAYBE 28·0 × 18·0 WITH WIDER SCREENS ETC.

℄ FLOAT CONVEYOR

(5)


ROOF 23.25
±16.0
18.25
±10.5
12.75
±9.5
11.75
±5.75
±4.75
7.0
±0
Dewatering Screens 10'x20'
FEED PREP (IF REQUIRED)
150
205
FLOATS
QQ
235
SINKS
QQ
230
210
380
325
325
CENTRIFUGES
not req'd
Per Cominco for crane access underneath.
VEHICLE ACCESS
305
250
252
415
385
A
6

**COMINCO FERTILIZERS**
**POTASH OPERATIONS**

F I L E  N O T E

Date: February 27, 1987

Subject: **HEAVY MEDIA SEPARATION - CAPITAL COST**

| | | |
|---|---|---|
| Those Present: | Cominco | - DAC, GAP, GAW, TSJ, RJV, DJL, CL |
| | Cascade Management | - J. Whittle |
| | Outokumpu | - Matti Travainen, David Green |
| | Impromin | - M. Porter |

1.0 This meeting was held on Wednesday February 25, 1987. The focus was Cominco's full scale Tri-Flo plant requirements.

1.1 We examined several rough layouts for building space and dimensions.

1.2 Based on present milling rates of 550 mtph., ore-size is presently 50% +20 mesh, and could easily go to 50% +10 mesh. We expect to treat only +10 mesh through Tri-Flo, at 300 to 400 mtph.

1.3 An existing 800 mtph unit required 30m x 15m plant wide Tri-Flo of 500mm diameter. Plant size could go to 28 x 18m.

1.4 Matti and Mark feel they would reserve comment on the throughput for Potash untill after the pilot plant testing. At maximum throughput the pilot plant will back up the feed chutes. There may be some reduction in efficiency in the 90-100% of capacity range due to particle interactions.

1.5 They would prefer to use an A.C. vibratory or equal screen, with horizontal stroke.

- Throw 8 - 10mm
- Speed .2 - .3m/sec.

1.6 Full scale plant has 2 stage magnetite recovery.

- 1st stage $\geq$ 99% efficient
- 2nd stage $\geq$ 50% of remaining 1%

1.7 Cost of breakdown for full scale facility, based on European purchased equipment costs, estimated within $\pm$ 10%;

- 40% - Screens
- 20% - Tri-Flo
- 25% - Magnetite recovery
- 15% - Other pumps

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1.8 We discussed the merits and problems associated with the use of the feed prep. screen as a separating screen for our product flow after the scrubber, but before desliming. Would require a fairly large area as it would also be required to screen 500-600 mtph of recycle from the crusher.

1.9 Structural consideration of the plant in some instances would be based on the ability to withstand vibration loading ie. under the screens.

1.10 Outokumpo would be capable and willing to undertake the design of the entire structure, from the foundations up. However, the detailed engineering would be by a subcontractor. Their preference is to carry out the detailed engineering including, piping and have the rest done by others. A compromise solution would have Outokumpu provide general equipment layouts and have all details prepared by a third party consultant firm such as Cambrian. In this fashion, Outokumpu will be able to critique the work for correctness but the details would conform to our requirements/standards, and reflect detailed knowledge of local conditions.

1.11 Outokumpu would provide equipment specificatons, and help in selection of successful suppliers.

1.12 The Tri-Flo units are built in Italy. They are of a nihard casting but some components have been made utilizing high-chrome.

1.13 Cost estimate for 4 Tri-Flo units including process fabrication and engineering is expected to be in the \$1.4 - 1.5 x $10^6$ range $\pm$ 25%.

- Design of process steel work included but not fabricated.
- Feed pump would also be extra. Other items not included are; crushing, piping, elec. building and foundations, installed standby pumps, spares, cranes and access to equipment.

From our discussion, they will reevaluate the process requirements and produce a more complete equipment cost estimate.

2.0 J. Whittle and C. Littmann walked the proposed project site. Cascade Management will be providing some budgetory capital cost for foundations, building, electrical and other services. One question which arose during the field visit was in respect to the tie-in to the existing plant. It may entail more work than expected. D.A. Cormode suggested that Cascade Management develop both senarios: self supporting structure or tie-in structure. We would then have Cambrian Engineering or some other structural firm review the plans.

---

Claus Littmann

# APPENDIX E

## ANALYSIS OF CAPITAL AND OPERATING COST

**CAPACITY:**

| | |
|---|---|
| Total Plant Capacity | 1.2 Million Tonnes Per Year Product |
| Heavy Media Plant Capacity | 0.6 Million Tonnes Per Year Product |

No change in mixture of products. Heavy Media production replaces production from one compaction plant.

**CAPITAL COSTS:**

| Item | Cost |
|---|---|
| A. Building [1] | $2.5 to $3.0 Million |
| B. Equipment [2] | $2 Million |
| C. Installation [3] | $2 Million |
| Total | $6.5 to 7 Million |

1. Report by Cascade Management
2. Preliminary estimate by Outokumpu representatives not firm
3. Typical construction experience for installation as a ratio of equipment cost

## ANNUAL SAVINGS $

| Area | Reagents | Rep Labor and Supplies | Power Consumption | Gas | Total |
|---|---|---|---|---|---|
| Crushing | - | 50,000 | 17,500 | - | 67,500 |
| Flotation | 1,760,000 | 25,000 | 21,500 | - | 1,760,000 |
| Drying | - | - | - | 117,000 | 117,000 |
| Compaction | - | 310,000 | 235,000 | 142,000 | 687,000 |
| Crystallization | - | - | - | 170,000 | 170,000 |
| Total | 1,760,000 | 385,000 | 274,000 | 429,000 | 2,848,000 |

An overall reduction in power demand of 3% is forecast which would result in a savings of $60,000 per year, bringing the total annual savings to $2,908,000.

Basis

1. 15% reduction in repair labor and supplies in crushing.
2. 15% reduction in power in crushing plant.
3. Reagent savings of $0.522 per tonne of ore due to reduced consumption of amine, depressant, flotation oil and frother.
4. Shutdown 1,500 cubic feet regrind flotation and use existing 2,400 cubic feet currently on coarse rougher flotation as regrind.
5. Heavy media plant would allow one compaction plant to be shut down entirely.
6. 25% reduction in fines requiring recrystallization due to coarser crushing in crushing plant and decreased amount of KCl being treated in regrind.
7. Gas savings based on current low rates in effect with direct purchase from producer which appear to be an all time low.

An improvement in plant recovery is estimated as a result of:

a) Decreased reagent usage, therefore less water added with reagents to process.

b) Reduction of 20% in centrifuge wash requirements because of coarser production.

c) Reduced grade water requirement.

d) Decrease in loss of fine potash in desliming process because of coarser crushing.

e) Decrease in potash requiring processing in crystallizer resulting in lower loss from hot thickener underflow.

The sum of these components is estimated to be about 0.6% improved recovery. This would be about 8,275 tonnes per year at a relatively low cost because of its incremental nature. Estimated return after taxes is $123,000.

The heavy media process would also permit the production of large size salt crystals suitable for use on highways for deicing. This market is currently supplied by IMCC or Kalium. Geography and hence, transportation costs would favor the Alberta and North Central Saskatchewan markets being supplied from Saskatoon area mines using the heavy media technology. There would also be a cost avoidance factor as this salt would not incur disposal costs.

## ESTIMATED OPERATING COSTS

| | | Million $ Per Year |
|---|---|---|
| Operating Labor | 5 Operators Per Year | 0.25 |
| Repair Labor | 3 Tradesmen Per Year | 0.15 |
| Repair Supplies | 7.5% of Equipment Cost $2 Million | 0.15 |
| Operating Supplies | Screens | 0.05 |
| Operating Supplies | Magnetite Plus Ferrosilicon<br>3 Kg/Tonne Product<br>Cost $0.10/Kg Equivalent | 0.18 |
| Power | | 0.17 |
| Total | | 0.95 |

Estimated Operating Cost Per Tonne Product = $1.58

## SUMMARY

**BASIS:** 600,000 Tonnes Per Year Production from HM Plant

| | |
|---|---|
| 1. Estimated Costs of Installing HM Process Assuming Additional Building is Required | $ 6.5 to 7 Million |
| 2. Annual Operating Cost | $ 0.950 Million |
| 3. Annual Savings | $ 2.908 Million |
| 4. Additional Net Revenue After Taxes from 8,275 Tonnes Increased Recovery | $ .123 Million |
| 5. Potential Sales of Coarse Salt | No Value Assigned at This Time |

Economics can be improved significantly if the existing building was used and the layout was such that no additional requirement for operating labor.